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OUR 61st YEAR

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MAY, 1950

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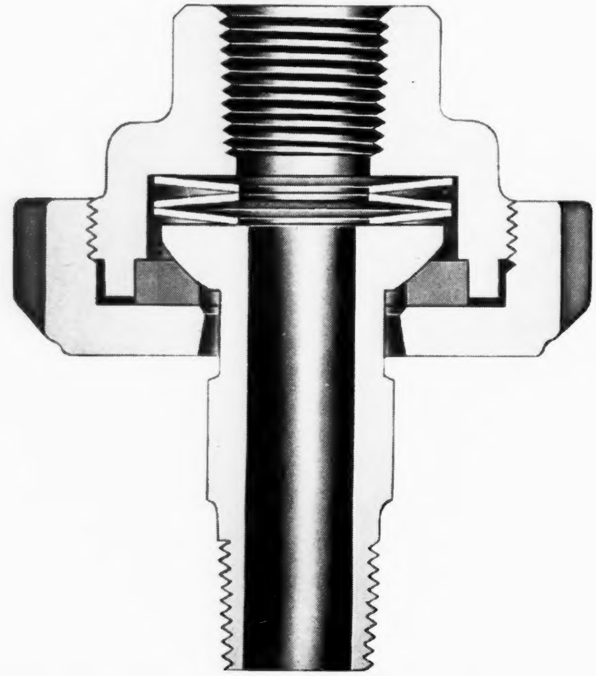

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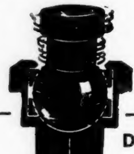

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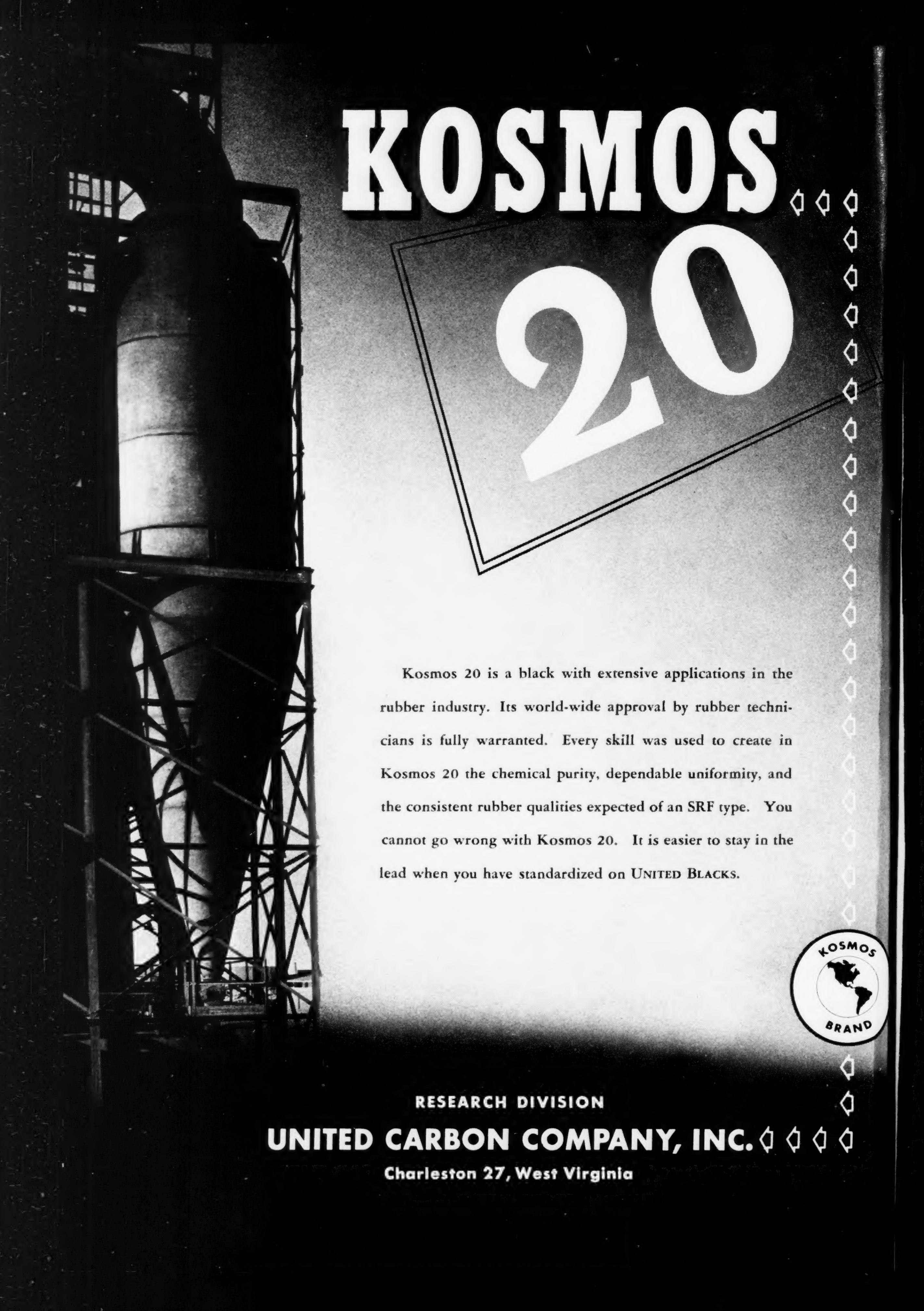
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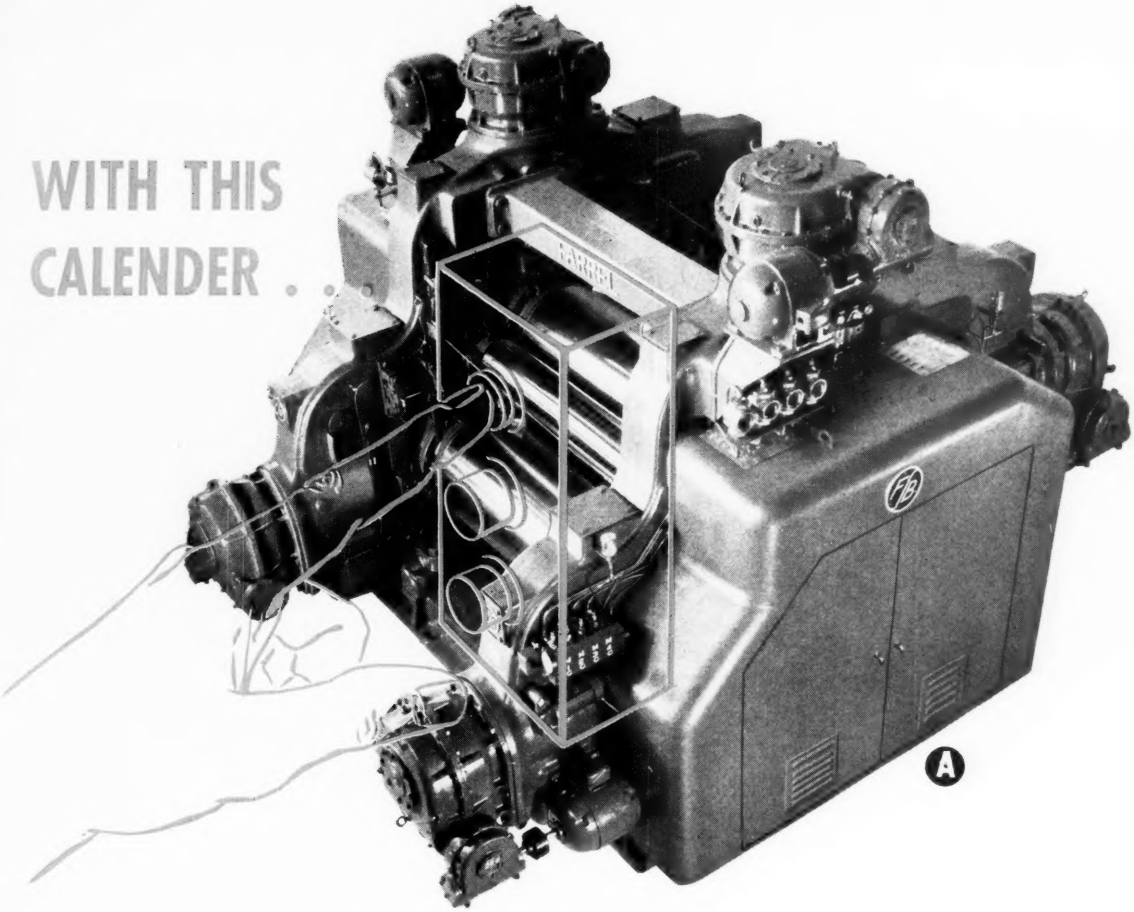
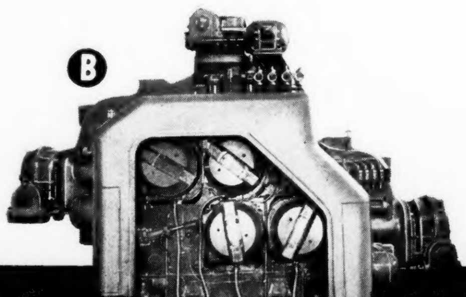


. . . you simply push a button to vary roll "crown"

A The Farrel-Birmingham Z-type calender was developed for production that demands extremely accurate gauge and temperature control. Plastic film is being produced regularly on the Z-type calender with a variation in thickness of only *plus or minus .0001"*.

B View showing the Z arrangement of rolls and connections for universal spindles from the uni-drive. Preloading devices eliminate backlash and hold the rolls firmly in their operating positions.



A unique feature of Farrel-Birmingham's new Z-type calender is its ability to handle a wide variety of stock compositions, at varying speeds, with extremely close control of temperature and gauge.

A built-in device for crossing the axes of the rolls compensates for roll deflection. Crossing the rolls (which is closely equivalent to varying the roll crown) is accomplished quickly by push-button control.

For film production, the two lower rolls are equipped with this device to adjust the rolls accurately for the final pass. For double coating, this feature can be installed for both upper and lower bank passes.

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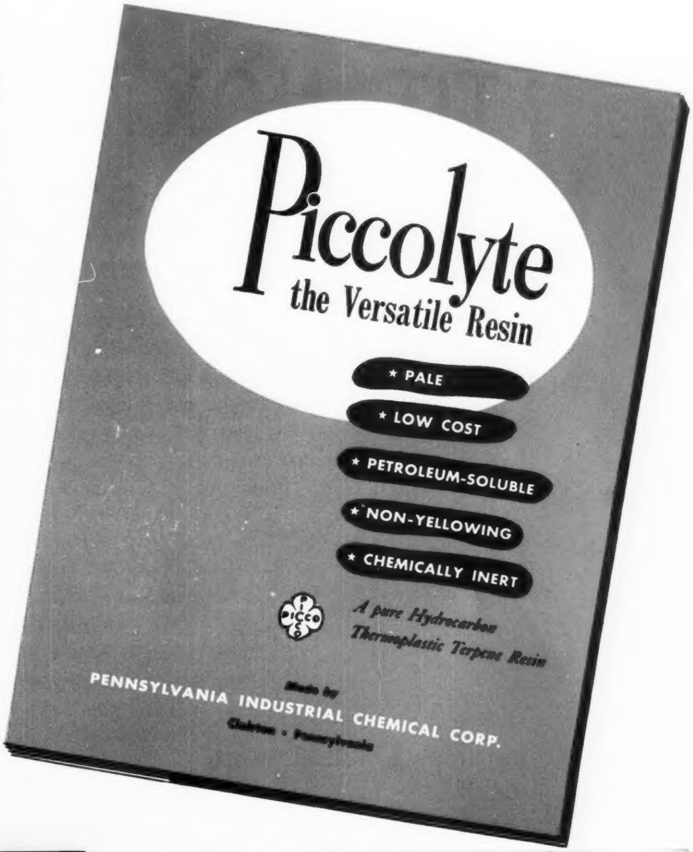

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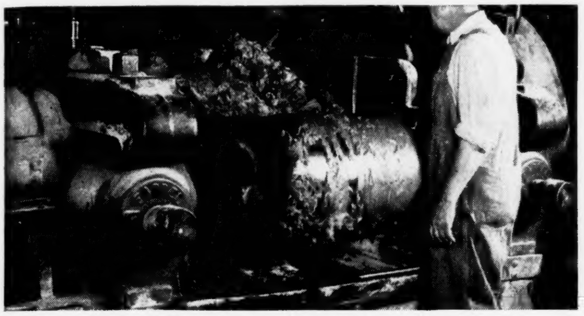
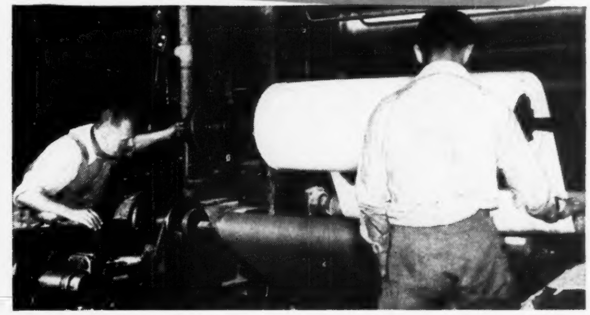
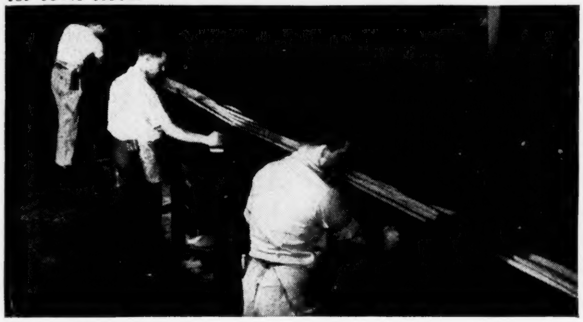


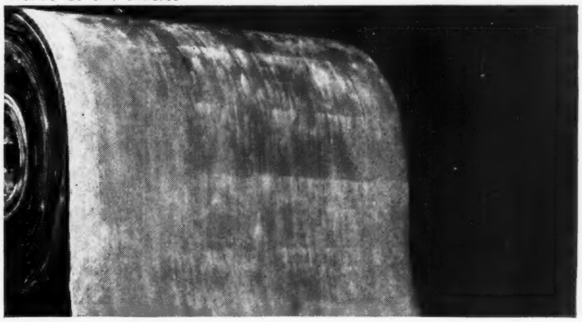
Plasticizing the rubber compound by passing it between rolls. The material is then used for impregnating the carcass, or is calendered for cover stock.



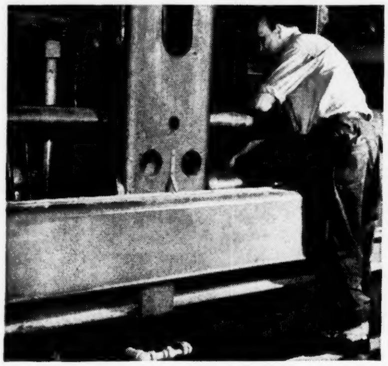
Frictioning the web material. Cotton duck is run against a slower moving roll carrying rubber compound, which is forced into the weave of the fabric.



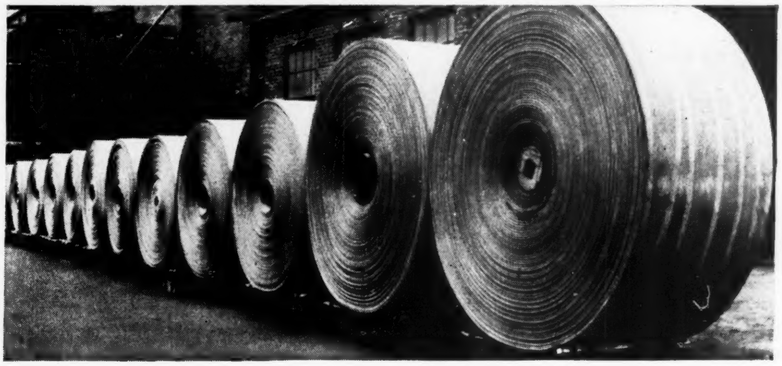
Building the belt body, by applying layers of cover stock to the frictioned carcass. Layers are rolled down to insure adhesion, and eliminate trapped air.



A roll of belting, ready for curing. The unusually wide product which the new press makes possible is suggested by this illustration.



Guiding the uncured belting in the Baldwin press, prior to curing.



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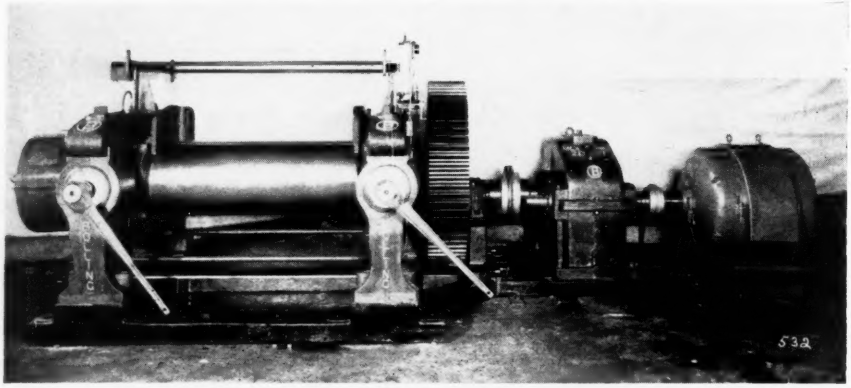

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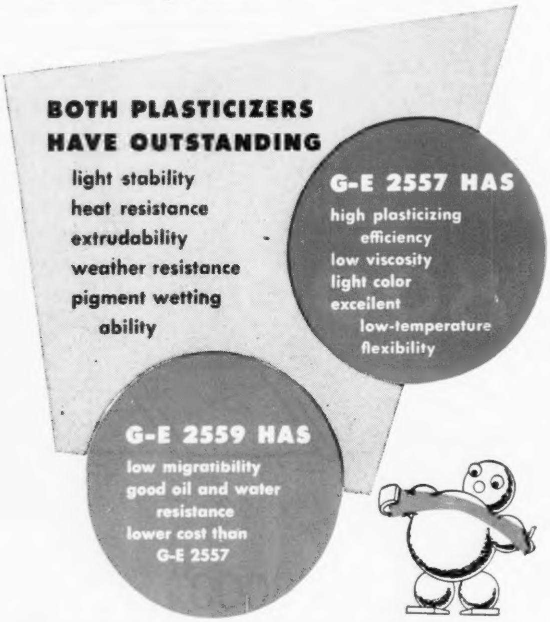

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May, 1950

Volume 122 Number 2

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MARKET REVIEWS

STATISTICS

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INDIA

RUBBER WORLD

Volume 122 New York, May, 1950 Number 2

Postwar Agricultural Production and Processing of Natural Rubber[1]

E. M. McColm[2]

THE author of this article recently returned from a six months' tour of duty in Malaya and Sumatra in connection with his position as technical director, Plantations Division, United States Rubber Co. He presents an extremely interesting and very up-to-date survey of the technical and economic problems facing the postwar natural rubber plantation industry and how these problems may be and are being solved. The article is in the form of a report to a hypothetical board of directors of an old plantation property, and Dr. McColm surveys in some detail the rehabilitation procedures that might be used, the processing techniques available, and the various types of natural rubber and natural rubber latices that might be produced and marketed, with special attention to current market trends and developments in the field of synthetic rubber. EDITOR.

I WAS asked to talk on the general subject, "The Growth and Collection of Natural Rubber," but since this subject seems to divide itself into two parts—the growth, and the collection of natural rubber—and since these two parts are not truly separable, because of all the interrelation between them, I prefer to speak under the title, "The Postwar Agricultural Production and Processing of Natural Rubber," for that is a more precise definition of what the modern rubber plantation actually does.

Survey of an Old Plantation Property

Let us then suppose that you constitute the board of directors and the stockholders of a company who, curiously enough, are all scientists, but are imperfectly familiar with rubber growing. You have, possibly to your considerable surprise, found yourselves possessed of a large acreage of natural rubber, all in bearing, but operating at a loss due to the deteriorated condition of the stand. You have commissioned me to visit the estate and report on its condition. I have just returned from that visit, and you have set aside an evening in which to hear my report. You have indicated to me that because of your general unfamiliarity with the subject you wish me to give a description of the scientific and practical aspects of rubber cultivation and modern processing and an estimate of the wisdom of rehabilitating and continuing operation in the light of present economic trends.

First, then, the general condition of your property. It consists of an area of flat land, having a general sandy soil of medium to low fertility. It is well drained by artificial drains and carries a stand of old seedling rubber, planted between 1912 and 1918. The trees were originally planted at a density of 110 per acre, but have now been reduced, as the result of wind damage and disease, to an average of 50 trees per acre. There are many large, open park-like spaces where there are no trees, owing to the ravages of a slow, but deadly root disease whose casual organism is a *Fomes* species. Some of the standing trees are also infected with a species of *Ustulina* which penetrates the wood around the lowest crotch and will weaken the tree so that it is readily susceptible to breakage during storms. In addition, there is a rather severe tapping panel disease called moldy rot prevalent in many areas during the wet season which can ultimately reduce a tree's yield to zero.

Your average yield is 350 pounds per acre per year of dry rubber, or about seven pounds per tree per year. Your all-in cost is at present the equivalent of 18 United States cents per pound, and your cash cost is 13¢ per pound. The present market price for #1 Smoked Sheet f.o.b. is 17½¢ per pound, and smoked sheet is your only product. Because of the antiquated character of your processing plant you are producing about 80% No. 1, 15% No. 2, and 5% No. 3 so that your average return is less than 17¢ per pound.

Your stand is deteriorating so rapidly that it has only about a seven-year life during which you can expect to make even a cash profit. You should, therefore, decide now whether you intend to replant and rehabilitate, or whether you will continue to operate as long as there is any cash profit, then abandon the property.

If your choice is the latter, there is nothing much to be done except get all the rubber you can by drastic tapping techniques. On the assumption that your choice will be the former, I have drawn up a statement of the proce-

[1] Presented before St. Josephs Valley Section, A. C. S., South Bend, Ind., Feb. 22, 1950.
[2] Technical director, plantations division, United States Rubber Co., New York, N. Y

dures you must follow and have indicated where a choice must be made.

Rehabilitation Procedure

Your first concern must be new rubber trees. Since I assume you will try to pay for your rehabilitation out of local cash profits, I would advise rehabilitating your processing facilities at a later date, concentrating now on replanting. To get these new rubber trees you must get rid of the old trees and prepare the land for replanting. You must also establish nurseries immediately so as to have replanting material available when the land is ready.

You will, of course, not plant seedlings, but, instead, buddings from selected high-yielding clones, and you may wish to include some selected seedlings taken from solid stands of single clones (see Figure 1). You will select these clones primarily on the basis of their yield, and you will be able to purchase budwood which will produce trees averaging 1,500 pounds per acre per year in yield. Other clonal characteristics to which you must pay attention are susceptibility to wind damage, disease resistance both pathological and physiological, growth rate and habit, speed of bark renewal, and, of recent importance, colloidal and chemical properties of the latex and rubber. (You will see from this statement that the plant breeders who developed these clones had to breed for a half-dozen characters, not just one, and the problem was, therefore, one of no mean magnitude.) Fortunately the public research stations in Malaya and Indonesia have lists of approved clones together with extensive records of their performance, and you can choose reasonably intelligently. Certain of the larger plantation companies have their own clones, but in general these are not for sale.

You will as chemists be interested, and as investors ought to be quite concerned with some of the newer developments concerning the properties of clonal latex and rubber. As you know, fresh latex is a hydrophobic suspension of rubber particles stabilized by protein. It is always contaminated by bacteria, when tapped in the usual way, and will putrefy and coagulate within a few hours if not preserved with a good bactericide and enzyme inhibiter. If preserved with a bactericide which is not an enzyme deactivator, the latex will coagulate aseptically in a period which varies from a few minutes to a couple of days, depending on the clone and its age. This point was proved in the late 1920's in the U. S. Rubber plantations laboratories. It has recently been found by a British Research team in Malaya that latex tapped aseptically and held bacteria-free, but unpreserved, will also coagulate aseptically, corroborating the earlier findings. (I mention this British work, though as yet unpublished, as of considerable importance in connection with preservation.) Some clones, when young, yield latex which coagulates so rapidly that the tapping cut soon becomes clogged, and, as a result, yield is nearly zero unless ammonia is dripped over the cut.

Certain clones are known to yield dry rubber of low viscosity, and others rubber of high viscosity. This condition undoubtedly means considerable variation from clone to clone in mean molecular weight, and since higher molecular weight means fewer rubber molecule-free ends and hence greater strength of the unmilled rubber, this character should be considered carefully in your choice of planting material.

Before purchasing the budwood of the chosen clones, you must establish nurseries of young seedlings which you can bud from the purchased budwood in order to multiply it sufficiently for replanting, for budwood is expensive, and it would be prohibitive to purchase all needed for replanting. It will take eight months to a year for the nursery seedlings to attain buddable size and 10 to 12 more months before the buddings have attained sufficient size to be cut for budwood.

While all this is being done, the land to be replanted is planted with seed, or with young trees germinated in baskets, planting two or three to a hole. When the plantings have reached buddable age, and assuming your scheduling has been good, they are budded with budwood cut from the nurseries; finally only the best one is allowed to remain; the other two are used to supply void spaces or are destroyed if not needed.

While the nurseries are being developed, you will be engaged in clearing the land for replanting, and there are several systems whereby this job may be done. Since clearing is expensive, even if done mechanically, and since the newly planted trees will not be tappable for five years, these systems have been developed to reduce clearing and replanting costs and to provide at least limited profits from the area while the young trees are growing. All systems involve slaughter-tapping of the old trees for a period prior to killing them. This is merely a much more drastic system of tapping in an endeavor to get a year's yield in a few months, before the drasticness dries the trees up completely. Experiments are now under way in Malaya to determine whether treatment of the tapping panel with plant hormones before or during this period will give a further, probably temporary, increase in yield.

A cheap, but in your case dangerous, next step is to poison the trees with sodium arsenite by ringing and painting the wood in the ring with the arsenic solution. The trees die in about three months, and the young trees are then interplanted in holes dug between the rows of the old stand. The old trees are allowed to rot and will finally fall and disintegrate. No one yet knows how much this practice will damage the young stand. It is known, however, that the arsenic does not penetrate to the roots, that the group of *Fomes* root diseases with which your estate is so heavily infected would not be killed by the poisoning and are transmitted from old dead roots to young ones whenever the latter come in contact with the former, in their growth through the soil. You can, therefore, expect that if you use this cheap poisoning method, your replanted areas will develop root disease fairly rapidly, necessitating continued expensive sanitation measures.

A system now being tried by estates which must replant and must use even a cheaper method is to poison two rows every 75 feet, replant in these rows using a hedge planting system in which the young trees are planted quite close together, and tap the intervening old rubber until the new planting is of tappable age; then destroy the old rubber by poisoning. Although a crop is actually obtained during the adolescence of the new planting, this system suffers from the root-disease danger of the former as well as finally producing a planting of hedges separated by wide unplanted spaces. What effect this method would have on yield, wind damage, spread of disease, etc., is unknown, but is very likely to be bad.

The most expensive method, and the safest, and most likely to yield a good healthy stand is, of course, complete removal of the trees by hand-felling or mechanical methods, followed by plowing and deep-raking the soil to remove nearly all the old roots. This method eliminates most of the old diseased roots and, therefore, reduces markedly incidence of root disease in the new stand. It is the only method to be recommended for your property.

When actual planting is begun, two decisions must be made concerning fertilization and planting density. You will obtain more rapid growth if fertilizer is added in

the planting hole. Phosphates are quite valuable, but a dehydrated material made in India from animal cadavers seems to give better results than straight phosphate manuring possibly owing to its organic, and possibly its hormone content. Experiments are now under way on U. S.

Fig. 1. Budgrafted Four-Month-Old Rubber Trees on the United States Rubber Co.'s Malayan Plantation

Rubber's Malayan plantations to determine whether additions of potassium, magnesium, phosphorous, and calcium, shown to be essential from sand culture experiments with small seedlings, will give better field growth. Results will not be available for a year or two, but will probably be disclosed by this company by the time you are ready to plant.

You must also decide on planting density. Obviously you will get more yield from 100 trees per acre than from one. But there is an optimum at about 175 for most clones, although many experts would hold this as too high. At this density wind damage, even of susceptible clones is low; and although good-looking, well-developed crowns do not result, yield is about maximum, which is what you are most interested in. Probably planting at a density somewhat above this value, subsequently thinning to this figure by removing the poorest yielders, would be the best plan.

While the trees are young, it is also advisable to establish a leguminous cover-crop which will prevent weed growth and erosion and will not reduce yield, although there is no good evidence that it increases yield. With this established, upkeep of the immature area is largely upkeep of roads and drains and supplying new buddings at the few points where the young trees die for one cause or another. There are few diseases of importance in the immature stands, very little insect danger, and control measures where necessary are well understood.

Tapping Systems

After about five years tapping can be begun, and then several decisions must be made. Such questions as the following must be answered: What manuring program will be followed, and will manuring be most successful if done annually or biennially in double the quantity? The effect of manuring is largely to induce growth of thicker, heavier-latex-bearing bark on the panel being

Fig. 2. Tapping Rubber Tree by the Half-Cut Spiral Method

Fig. 3. Field Labor Returning Daily Latex Collection to Central Station

tapped at the time the fertilizer is applied. The effect of manuring on yield reaches its maximum, therefore, several years after the application, when tapping is again on this panel. You cannot, therefore, expect immediate startling results from manuring, but you will have bad results in a few years if you do not use it. On your soil the only fertilizer so far shown to be necessary and safe is ammonium sulfate. United States Rubber Co. has just completed a classic experiment in Sumatra which ran for 31 years and was the first to demonstrate the value of nitrogen manuring on *Hevea*. The results are definite and indisputable.

You will also have to decide on the tapping system you wish to follow, of which there are several. Most clones will give their maximum yield when tapped on a half-cut, that is, spirally half way round the tree, as in Figure 2, over equal alternate periods of time. For some trees, however, this tapping is too drastic, and they will develop a physiological disease of the tapping panel called *Brown Bast*, which interferes with or completely stops yield. These trees must be tapped less drastically, say, on a third cut on alternate equal periods of time or a half cut during one-third of the time. If the clone is not susceptible to *Brown Bast* and is tapped alternate equal periods of time, it can be tapped alternate daily, weekly, fortnightly, or monthly. There is some slight evidence that yield is higher by the alternate fortnightly system, but greater variability of the rubber and the latex is to be expected, and greater incidence of the panel fungus disease, moldy rot, is observed. Since the emphasis is now on eliminating variability, alternate daily is the system recommended.

Perhaps one further system should be mentioned since it is used by several large producers. It is the full spiral, once in four days. The United States Rubber Co.'s ex-

perience in Sumatra and Firestone's[3] in Liberia indicate that by this system yields fall off after several years. Moreover the trees drip till early afternoon, resulting in some bacterial activity in the latex before collection unless a preservative is used in the cups. For these reasons, and in view of my subsequent processing recommendations, this system is not recommended for your property.

In addition to general upkeep, after your new area is in tapping you will be well advised to initiate an inspection system to insure that tapping depth, almost to the cambium, but without serious wounding of the cambium, is maintained. Since the numbers of latex vessels in the bark increase inward toward the cambium, shallow tapping results in lost yield. Your inspector should also be trained to recognize disease when he sees it, for it is only by careful watchfulness, accompanied by adequate measures of plant sanitation, that satisfactory freedom from disease can be maintained.

I have now given you a picture of the present status of your property and the best of the known techniques for rehabilitating it. We have considered selection of high-yielding clones, clearing, planting, manuring, tapping, and disease control. It is worth remarking in passing that solution of the problems in each of these categories has involved extensive experiments in both public and private experiment stations over many years, and millions of dollars have been spent in obtaining these solutions. It is probably not far from the truth that modern *Hevea* culture rests on as extensive and scientific a foundation as any crop in the world.

Processing Recommendations

We come now to the second portion of my report which concerns processing. As I mentioned earlier, your processing equipment is old, antiquated, and inefficient. It produces an inferior product at a high cost and should be entirely replaced. When you are prepared financially to do so, you must decide just what you want to produce. Perhaps I can explain the possibilities and the economic situation which you will need to consider in making your choice.

There are two general types of product, either or both of which you could consider. I refer to dry rubber and latex. Let us consider first the former.

Your field labor will bring its daily collection of latex into the several central collecting stations between 11:00 a.m. and 1:00 p.m., as shown in Figure 3. This latex will then contain one to five million bacteria per cubic centimeter. If untreated in some way, this latex will have developed a decided putrefactive odor by 3:00 to 4:00 p.m. and may be completely coagulated by 6:00 to 8:00 p.m. It will have developed a pronounced coloration by this time and is millable only into an off-grade crepe which will be fast in cure and is likely to be somewhat poor in aging. To obtain high quality of product you must prevent this bacterial activity, and the conventional technique is to acidify to about pH 4.5, which causes a slow gelation to a weak gel which slowly by syneresis toughens to the point where it can be handled. Such coagulum can then be milled to a crepe in rough, uneven-speed mills which require considerable power, or in small even-speed mills to a sheet. Since crepe is valuable largely because of its very pale color, the latex is usually treated with sodium bisulfite prior to coagulation, for the sulfurous acid set free on coagulation will deactivate the oxidase present and prevent enzymic browning on coagulation. Latex from some clones and from freshly opened trees will contain appreciable amounts of a yellow

[3] India Rubber World, Feb., 1949, p. 592; Mar., p. 723.

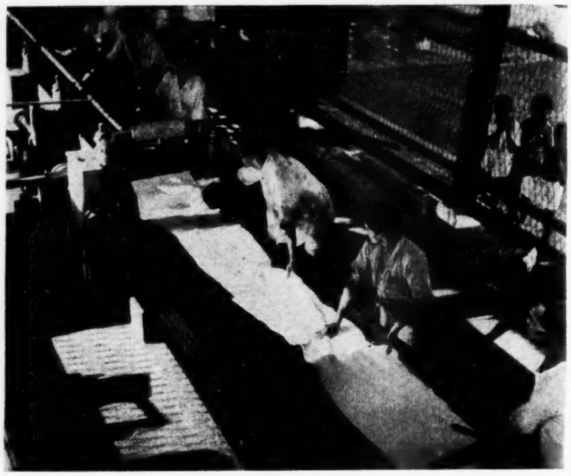


Fig. 4. Smoked Sheet Coagulum Being Passed through Even-Speed Rolls and Washed Prior to Smoking and Drying

coloring matter. This can be removed by carrying out a precoagulation, which consists in adding a very small amount of acid and agitating. A small amount of coagulation occurs, and the coagulum contains most of the color. This is removed, and the regular coagulation step will then produce a very pale crepe.

The creping operation involves passing the coagulum through the rolls a total of 10 to 15 passes, under a stream of water. This results in washing out most of the non-adsorbed non-rubber substances present in the serum and originally occluded in the coagulum. Crepe, therefore, tends to be somewhat more uniform than sheet since some of these substances affect cure.

The crepe after milling is hung to dry in an unheated dry house (heat to 90° F. may be applied if available) and usually takes seven to ten days to dry, depending on the weather. Forced drying will result in off-colors, and since crepe is usually purchased for use in light-colored goods, such colors will decrease its price.

Because of the high power requirement, heavy creping machinery, and large drying facilities needed, the capital cost is high. Before the war crepe sold at a fraction to 1¢ above smoked sheet; now because of its scarcity it gets a 3-4¢ premium. The United States consumption of crepe is only a few per cent. of our total natural rubber import and is not likely to increase. I do not recommend crepe production on your estate because of its high capital cost.

Smoked sheet is produced by passing coagulum through light even-speed rolls whose function is mainly to compact it sufficiently to permit handling and to squeeze it thin enough to permit rapid drying. (See Figure 4.) After milling, the sheet is usually hung to drip for a short period, then placed in a heated chamber where it is dried. Early dry-houses were heated by building a fire under them and allowing the hot gases and smoke to pass up through the house and out the top. The rubber absorbed smoke constituents, acquired an amber color, and was known as smoked sheet. Since the smoke constituents discourage mold growth during storage and shipment and since the amber color makes the rubber a standard market grade, modern smokehouses have retained the smoke, but have obtained heating either directly as before, or with steam. The best of the modern houses will dry rubber and smoke it in 48 hours; whereas the old houses, of the type you now have, take about seven days. A smokehouse that dries the rubber in four

days on U. S. Rubber's plantation in Malaya is shown in Figure 5.

Several years before the war, during a study of the causes of variability, my colleagues and I isolated a fraction from latex serum which activates markedly the accelerator, mercaptobenzothiazole, one of the most widely used in the rubber industry. Latex serum has a nearly constant total non-rubber content, but latex rubber content may vary seasonally and will vary over the tapping period, being highest at the beginning and lowest at the end. Consequently the proportion of non-rubber to rubber will be lowest when the rubber content is highest and *vice versa*. We do not know, but it seems probable that this MBT activator is present in the non-rubber in a relatively constant percentage; hence its proportion in rubber would vary with the rubber content of the latex. Now it is the practice in sheet manufacture to dilute the latex to a constant rubber content, 15 or 20%, before coagulation. Thus a latex of high rubber content will start out with a lower proportion of activation to rubber, and the activator will be diluted to a greater extent than a latex of low rubber content. One would expect a fast vulcanization from a low-rubber-content latex and a slow vulcanization from a high. This is indeed what happens. Quite large variations in rate of cure have been observed between rubbers prepared by diluting to a constant rubber content before coagulation latices of 30 and 40% rubber contents. Since the periodic variation in rubber content of latex can be eliminated by tapping alternate daily instead of alternating longer periods, this consequence is a strong argument in favor of the alternate daily system.

Those of you who have worked with natural latex in this country will have noted that it coagulates instantaneously on acidification. Goodrich chemists have shown that freshly tapped latex, which goes through a slow gelation period on acidification, can be made to coagulate instantly if fatty acids are present, and this procedure is the subject of a continuous sheeting patent. The procedure should effect some labor saving in sheet manufacture, but the necessary equipment is not yet on the market, insofar as I am aware.

You no doubt know that one of the complaints the American rubber goods manufacturer has against crude natural rubber is its considerably greater variability than synthetic rubber in several important properties, especially in rate of cure and viscosity, commonly called plasticity. There are several other causes of variation in rate of cure than that mentioned above. While some inherent variation in plasticity is probably due to variation in molecular size, there is probably considerable introduced by processing. Thus it has been shown that smoked sheet becomes less plastic as it ages, and there is some reason to believe that a smoking step accelerates this increase. The cause of this hardening is not known, but is presumed to be due to the formation of oxygen cross-links between molecules.

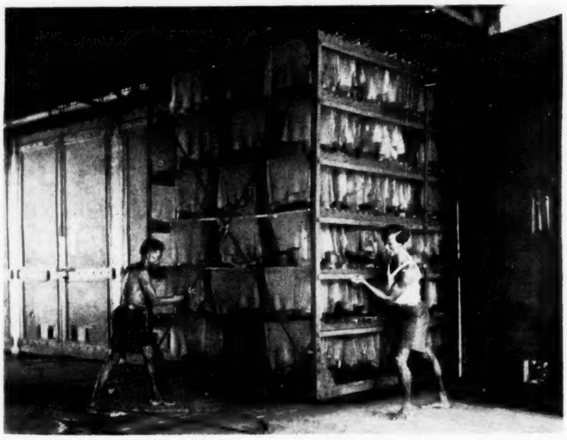


Fig. 5. Smoked Sheet Being Removed from Oven after Drying and Smoking for Four Days at 110, 120, 130, and 140° F. Each Day

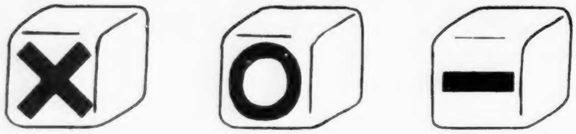
Insofar as present knowledge goes, it is impossible to produce a completely uniform smoked sheet, and to meet the American criticisms the French in Indo-China have begun classifying their exported rubber into three classes of rate of cure, fast, medium, and slow; and into three classes of plasticity, hard, medium, and soft. Each bale of each of the three present appearance grades of sheet is marked with appropriate symbols to indicate its classification, as indicated in Figure 6. Since French Indo-China produces such a small proportion of the world's crude rubber, American criticism will not be answered very satisfactorily, even if this system is accepted as the answer to variability, unless the major producers, the British and the Indonesians, also follow the same or a similar course.

I am glad to be able to report that on my recent trip I sat in on discussions in Malaya and in Sumatra which have resulted in plans in both countries, and similar plans have been made in Java, to study the situation and come up with recommendations as to how a classification scheme for exported rubber can be applied, and such studies are now under way. There is probably not much argument with the French scheme as far as plasticity goes, but there may be argument concerning the rate-of-cure criterion. Thus it may be found more desirable, from several standpoints, to divide all exported rubber into lots of 10 or 20 tons, and to accompany each lot with a statement of its mean rate of cure, and the standard deviation. This practice might result in a subclassification based on the size of the standard deviation of the rate of cure of the lot. Which system will be applied will probably depend largely on American preference, and the Far Eastern workers are hoping to get valuable advice from the crude rubber subcommittee of ASTM Committee D-11, whose chairman, Dr. Norman Bekkedahl, of the Bureau of Standards, has already been appointed.

It is expected by the Far Eastern workers that if this classification scheme fills a definite need and proves itself of value, it will eventually result in pressure developing to narrow the classes so that natural rubber will eventually approach synthetic in uniformity within the classes. From your standpoint you need to consider that any production facilities you provide may require subsequent modification to permit improved uniformity as causes of variability are discovered, and the remedies found; for it will be obvious that if these schemes actually do the American manufacturer any good, the demand will be for such rubbers, and he who cannot fit his product in will have to sell it at a discount in order to dispose of it.

Shortly before the war McGavack and coworkers of the United States Rubber Co. developed a new technique of producing rubber which resulted in a product called US-F Rubber.[4] By this procedure latex was preserved with formaldehyde and aged several days in such a way that all dirt was allowed to settle, or could be centrifuged out, and a week's production was bulked,

[4] *Ind. Eng. Chem.*, Nov., 1942, p. 1335.



A B C

Fig. 6. Identification of Specification Rubbers of Syndicat des Planteurs de Caoutchouc d'Indochine and Union des Planteurs de Caoutchouc

MARKING

Plasticity
- A — Mooney Viscosity >87 — X
- B — Mooney Viscosity 73-87 — 0
- C — Mooney Viscosity <73 — ▬

Vulcanization Rate — A, B, and C
(Using A. C. S.—I Compound Vulcanized 40 Minutes at 127° C.)
- Red—Slow Vulcanization: 600% Modulus, <30 kg/cm.^{2} or 426.6 p.s.i.
- Yellow—Medium Vulcanization: 600% Modulus, 30 to 50 kg cm.^{2} or 426.6 to 711 p.s.i.
- Blue—Fast Vulcanization 600% Modulus, >kg cm.^{2} or 711 p.s.i.

which policy eliminated a considerable amount of small day-to-day variation. This aged latex was then flocculated, the flocs creamed to remove a relatively constant proportion of the non-rubbers, then coagulated, creped, and dried. About a year's production in a semi-works-scale plant was obtained prewar, and about nine months' production has now been completed in a pilot-plant postwar. It has been found that this rubber, while somewhat more costly to make than sheet or crepe, is much more uniform, absolutely clean, softer than most market grades, and as transparent as pale crepe. Moreover the rate of hardening on aging is less than that of sheet. Certain uses for this rubber, where its cleanliness, uniformity, and softness are of distinct economic importance, are developing, and a fairly substantial market, even at the necessary premium price, may result. You should watch this development for if the market materializes, as U. S. Rubber chemists hope, that company may be prepared to license its patents.

Other special types of crude rubber have from time to time made their appearance. Triple-creamed or triple-centrifuged latex, coagulated and creped, with or without caustic or enzymatic protein hydrolysis, was produced on a small scale prewar for special electrical uses. A very soft rubber is now being produced by Socfin, Ltd., under the name Plastorub.[5] It has a low viscosity and requires little power to break down. Recently a prooxidant having the trade name of Pepton,[6] which is an acylamino diphenyl disulfide and is marketed by American Cyanamid Co., has attained some prominence. If Pepton is added to latex before coagulation, a perfectly normal sheet or crepe is obtained, but at temperatures above 240° F. this rubber breaks down much more rapidly than normal rubbers, so that the viscosity *versus* time of breakdown curve is much steeper than normal. The use of Pepton results in power savings to the American user, and the rubber so produced is marketed under the name "Smoked-Sheet Plus" at a small premium over sheet.

Of all these I would advise you to consider production of "Smoked-Sheet Plus" only at the present time, pending better knowledge of the market acceptability of these new types.

Latex Production

The other general type of rubber production which you may wish to consider is latex. In the case of dry rubber the standard market grades are classified according to appearance only, which bears only a very remote relation to the intrinsic physical and chemical properties which determine the rubber's real value. In contrast, the large producers of latex developed their product to meet technological requirements, and the production procedures used have had to conform. Generally speaking, the large producers are capable of producing quite uniform products of good technical quality.

In the U.S.A. latex is not sold as an open market commodity as is rubber, but each producer or his agent handles the product through salesmen and sells on quality and reputation. This practice, of course, necessitates maintaining all the appurtenances of modern merchandising, including bulk storage facilities, salesmen, credit departments, inventories, etc., and is more expensive to set up and operate and lately has been slightly more profitable than sale of dry rubber on an open market. You should not consider production of latex for American sale unless you are prepared to provide these facilities or appoint a sales agent who already has them.

Alternatively you may consider concentrating on sale to Europe and the rest of the world, as some of the smaller producers are now doing. Because the rest of the world is not so far advanced in latex use as is the U.S.A., technological requirements abroad are generally still less strict than here, and latices which we would consider of poor quality have been accepted there. Drum shipment is still common, as contrasted to bulk steamer shipment here, which makes bulk storage facilities unnecessary, although cost is thereby increased. In some European areas latex is merely latex; the only requirement is rubber content; whereas in the United States the buyer is usually concerned with some or all of the 17 technical specifications.[7]

You will assume, correctly, that technological control of all steps in the process from the tree to the consumer is necessary, particularly for continuing successful sale in the U.S.A., and if you are not prepared to finance such a project, then latex is not for you.

Assuming, however, that you wish to enter the latex market, you will have the choice of two main types of latex. Practically all latex entering the market at present is concentrated, by processes which raise the rubber content from about 35% to 60-70%. One process attains this object through the use of a modified milk centrifuge, of which two types are on the market. Another involves a creaming step through the use of a chemical creaming agent which causes reversible flocculation, and rapid creaming results. In both cases latex must be carefully protected with preservatives from bacterial attack, and careful attention to cleanliness all the way along the line is necessary.

Centrifuged latices are simpler to prepare, require less elaborate equipment, but can economically produce concentrates having rubber contents not much above 62%. Rubber losses in the skim are high, and to date methods of recovery of the skim rubber yield products salable at prices below the price of the concentrate.

Methods of recovery of the skim usually involve coagulation and sheeting or creping to produce an off-grade dry rubber. U. S. Rubber, however, recently began creaming its skim and is finding good acceptance of the creamed product, although the present scarcity of latex of all grades may be contributing to this acceptance. A period of latex plenty is really needed to evaluate the real market acceptance of this product.

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5 India Rubber World, Mar., 1949, p. 739; Apr., p. 114.
6 *Ibid.*, July, 1949, p. 459.
7 Published as information only by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

The creaming process, while possible to operate in a simple way with a minimum of equipment, produces thereby a variable and inferior product, as indicated by references in the literature by European latex technologists to the superiority of centrifuge concentrate over cream. This European opinion on creamed latex was due to the fact that the few cream shipments made to Europe prewar were largely produced by small estates with inadequate equipment and know-how. Modern methods, however, of considerably greater complexity, and requiring much greater know-how, as used by Waterhouse, Goodyear, U. S. Rubber, and one or two others, are capable of producing uniform materials of high quality, with practically no skim rubber loss, and at rubber contents approaching 67%. Figure 7 is an illustration of a modern latex creaming plant on U. S. Rubber's plantation in Malaya. Although the viscosities of such products are around 125-150 centipoises, they are still fluid enough to be pumped through pipes and handled in other ways without difficulty.

A third concentrating process in use by Revertex, Ltd., involves concentration by evaporation, or by a combination of centrifuging and evaporation, but the processes are covered by patent and produce only a minority of the latex sold.

At the present time there appears to be a world scarcity of natural latex. Whether this indicates an expanding market is not known, but the optimists believe it does, largely because of the increased consumption of latex foam sponge. Since new latex products are coming along in some of the large producers' research laboratories, the latex game is worth the candle only if you are prepared to spend money on research yourselves to keep abreast of competition. I personally believe, however, that natural latex has a good future despite synthetic competition, for it is obvious that with natural latex now selling at several cents above the synthetic product, manufacturers are already using all the synthetic latex their product will tolerate, and still there is a scarcity of natural. In general, because of the low tensile strength of its films, synthetic latex is not usable to more than a small percentage in any product involving unsupported films. It is valuable in

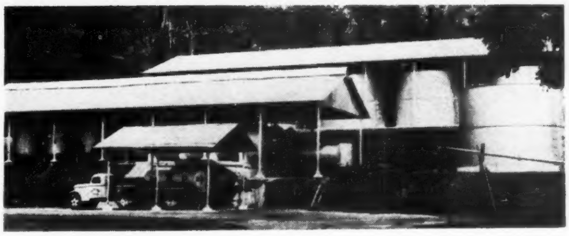


Fig. 7. Modern Latex Creaming Plant on U. S. Rubber Co.'s Malayan Plantation; Large Tanks in Background Are Creaming Tanks; in Foreground Are Horizontal Storage Tanks from Which Creamed Latex Is Transferred to Tank Trucks

impregnation operations and for admixture with natural where the product need not have the full high tensile strength characteristic of natural.

Taking the economic situation as a whole, it seems likely that present grades of natural dry rubber have a good future for a few years at prices fluctuating around the price of synthetic, and under present conditions, if you replant, you can expect a reasonable profit. Unless, however, natural crude rubber can be reduced in variability or grades established which represent its intrinsic worth, it is likely gradually to lose ground in the United States to the synthetic product, especially as the latter is gradually improved. European recovery and industrialization in the Orient will probably, however, become increasingly important in the natural market, and American synthetic can be expected to have less influence on natural prices in the future. Fortunately there are enough influential people in Malaya and Indonesia awake to the danger of a do-nothing policy so that there is a very good chance of natural improvement—so good that I believe your investment in rehabilitation to be worth recommending.

In the case of latex, that is already on a sound technological basis and eminently able to hold its place in competition with synthetic.

For obvious reasons these recommendations take no account of the political situation in the rubber producing countries, since you commissioned me to advise on only the economic future of your plantation, not the political.

Rubber Powder Developments

A FIVE-YEAR research and development program has been launched jointly by the Rubber Research Institute of Malaya, the British Rubber Producers' Research Association, and the British Rubber Development Board, for the period 1949-1953. The program will cost about $25,000,000 (Straits currency), to be financed mainly by a cess on Malayan rubber producers for the Malayan Rubber Fund, and the Government of the Federation of Malaya will guarantee any deficit. The greater part of these funds will be handled by the Rubber Research Institute whose extended research program will include work on the preparation of special rubbers, among which rubber powder will figure importantly.

The experiments carried out in America with Mealorub, the Dutch rubber powder, in road surfacing, and the possibility that within five years demand from the United States for this purpose might go up to 100,000 or even 200,000 tons annually, have given a tremendous stimulus to interest in the production of rubber powder, and rubber producers hopefully await further developments. Since Mealorub is a Dutch process, some anxiety was expressed in the local press over Malaya's share in the business in rubber powder in the event the looked-for demand from the United States materializes.

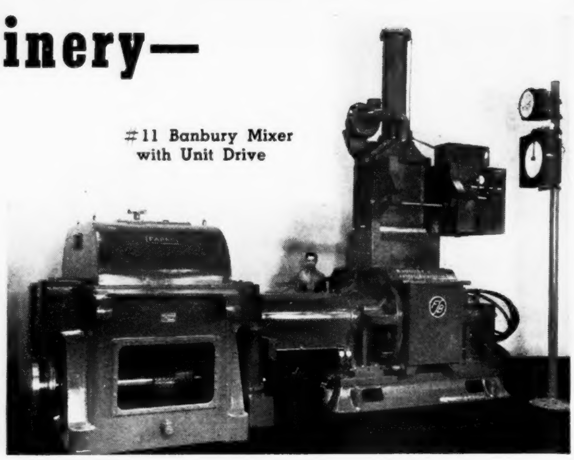
The director of the Rubber Research Institute, C. E. T. Mann, made the reassuring statement that negotiations had been entered into with the Dutch Government for permission to manufacture Mealorub here. It was explained that under an agreement between British, Dutch, and French producers the field for research and development of new uses for rubber had been apportioned among the three countries in order to prevent waste effort.

Before the agreement Dutch chemists had done much research on the preparation of rubber powder; so further work in this field was left to them. Under a patent pooling arrangement operated by the International Development Committee, promising new developments

(*Continued on page 222*)

Rubber Mixing Machinery—the Banbury

D. A. Comes[1]



#11 Banbury Mixer with Unit Drive

I WAS asked to talk on rubber mixing machinery in general, but since my experience with the two-roll mixing mill is limited, most of my remarks will be on Banbury mixing. The two-roll mill, as far as I am concerned, is something to put under a Banbury mixer to be used as a sheeter. There is one thing about a mixing mill, however, of which I thoroughly approve, and that is, it mixes by the batch method.

It is our belief that in order to get a thorough dispersion of all the ingredients during the mixing operation, it is necessary to keep them in the form of an individual batch, at least for a short period.

The bread industry is much older than the rubber industry, and it has always been the desire of the big producers in this field to do their mixing continuously. Since they have a large mass of flour and have to mix into this small amounts of sugar, salt, and yeast, they have a mixing problem somewhat similar to that encountered in the rubber industry. It is necessary to get a really good dispersion of these small amounts of important ingredients, and in order to accomplish this dispersion satisfactorily bread manufacturers still do their mixing by the batch method.

The screw-type machine can be used for blending and converting rubber and/or plastics, and, in fact, we are at the present time feeding a plastics calender with a screw-type mixing machine.

In the plastics industry it is possible, when calendering a highly plasticized resin containing no filler, to sprinkle the resin directly into the bite of the calender rolls and do what little mixing and all the converting necessary at that point. Very high-grade four-mil vinyl film is produced by this method of processing.

With plastic compounds that include increasing amounts of fillers, however, it is necessary to have regular and separate mixing equipment. If the compound contains only a small amount of filler, one two-roll mill for mixing and converting is adequate. For more heavily loaded compounds one additional mill may be sufficient, but often it is necessary to have a Banbury mixer followed by two mills for mixing and converting the compound before calendering.

Some Problems in Banbury Mixing

Several years ago I was called into an insulated wire plant where they were using a #3A Banbury, and every batch of one-type compound being mixed was always full of compound specks. After trying almost every possible combination of ingredients and order of addition without eliminating the specks in the mixed compound, we added all the rubber and compounding ingredients to the Banbury at once and slapped the ram down on top of the batch. This method, which produced the desired results in this case is now termed "upside down" mixing. Further details on this somewhat unorthodox method of mixing will be given in the answer to one of the questions in the panel discussion which follows.

[1] Assistant general sales manager, Farrel-Birmingham Co., Inc., Ansonia, Conn.

The principle I wish to establish is that in Banbury mixing, in order to disperse pigments in rubber or plastics, work must be done in the mass itself. Good dispersion is obtained only when the mix has a fairly stiff consistency, and the harder a given pigment is to disperse, the stiffer the mix must be kept until a satisfactory dispersion is accomplished. Among the several ways used to keep the mix stiff until good pigment dispersion is obtained are: mixing at as low a temperature as possible, adding the softeners near the end instead of the beginning of the mixing cycle, and removing the batch from the Banbury for cooling and then returning it for further mixing. This procedure will be recognized as the masterbatch method of mixing.

I would like to cite the case history of another mixing problem in industry that will illustrate the above principle that the mix must be fairly stiff until good pigment dispersion is achieved. At another insulated wire plant a compound was full of specks after mixing in a #11 Banbury. Observation of the mixing procedure revealed that the rubber and reclaimed rubber were followed immediately by all of the softeners which produced a soft mass in the Banbury which at this stage in the mixing cycle sounded like hot asphalt. The mixing procedure was changed to loading the rubber and reclaim for about a minute and one-half breakdown, adding all the fillers while the mix was stiff and good dispersion could be obtained, and then adding the softeners at the end of the mixing cycle. Sometimes it may be necessary to add a small amount of the softeners at the start of the mixing cycle in order to keep the batch together, but this amount should be kept as low as possible.

When a rubber compound consists of a very small amount of rubber and a very large amount of fillers, it is necessary to build up the compound volume in the Banbury slowly until enough mix is present to permit the rapid addition of fillers without the batch crumbling and separating into several non-homogenous parts.

The case history of another industry mixing problem will illustrate this point. A certain plant was mixing an extremely highly loaded rubber tile compound and found that they could not keep the batch from crumbling. By adding the fillers to the small amount of rubber very slowly and in very small amounts and allowing enough time for the batch to come together after the addition of each small portion of filler, they built the batch up in volume until the rotors could easily work on it. Unfortunately the rapid addition of the last portion of the fillers to this particular compound stalled the Banbury, indicating that despite the slow careful addition of fillers to the compound up to that point, the proportion of fillers

to rubber was in excess of the physical capacity of the rubber to absorb them, and the compound required reformulation.

Mixing action in the Banbury is obtained between the rotors and the walls of the chamber, not between the rotors themselves. Since no work is done between the rotors, the friction ratio between the rotors is unimportant. The operation of the rotors of a Banbury at different speeds enables one rotor to drag the stock against the rear of the other and thus help clean ingredients from this area.

The more activity present in the bank of a Banbury, the better the pigment dispersion will be, and the greater the clearance between the tip of the rotors and the side of the Banbury, the more activity there will be in the bank. Of course there is an upper limit for clearance between the rotor and the side of the Banbury, and this is about 1½ inches.

Higher Banbury Speeds and Pressures

For a given Banbury the higher the speed and the higher the pressure used, the greater will be the amount of heat of mixing generated and the horsepower consumed. The present standard speeds for the #11 Banbury are considered to be 20, 30, and 40 r.p.m. We have sold some Banburys capable of operating at a speed as high as 60 r.p.m., but this is not considered standard.

Batches mixed at higher than 20 r.p.m. are completely mixed at lower temperatures and in a shorter time, but must be removed from the mixer earlier since overmixing may produce higher than normal temperatures and scorched stock. For example, if a batch is usually mixed at 20 r.p.m. in ten minutes and reaches a temperature of 250° F. at the end of that time, the same batch mixed at 40 r.p.m. will have a satisfactory dispersion of ingredients in five minutes and must be removed from the Banbury at that point to avoid scorched stock.

Even with speeds of 20, 30, and 40 r.p.m. available, Banbury mixers are purchased for use at one or two of these speeds, some at the high level and some at the low. Some Banburys are delivered capable of operating at 20 and 40 r.p.m., and the lower speed is never used; others are ordered for operation at 20 and 30 r.p.m., and the possibility of using the higher speed of 40 r.p.m. is disregarded.

Over the years there has been a decided trend toward higher speeds and therefore higher horsepower requirements for the Banbury mixer. The #11 Banbury was built at first for operation at 20 r.p.m. and driven by a 200 h.p. motor. The horsepower of the motor was soon increased to 250, and with the advent of the two-speed Banbury operating at 20 and 40 r.p.m. the drive required was 250/500 h.p. At the beginning of the late war we were asked for and provided a #11 Banbury for operation at 20 and 40 r.p.m. with a 300/600 h.p. drive. At the time of the Military Tire Program of December, 1944, we received an order for early delivery of 70 #11 Banburys, about half of which were to be built for operation at 30 and 40 r.p.m. with 450/600 r.p.m., 450/600 h.p. motors. The remainder of this order was for slow speed motors for operating the Banburys at the same 30 and 40 r.p.m. speeds.

Very soon after the end of the war we were asked to build a #11 Banbury for operation at 20 and 40 r.p.m. with a 400/800 h.p. drive for mixing highly loaded rubber floor tile stock. We felt that this was going a little too far for standard Banbury construction, and the unit-type drive for this mixer was designed. The bull gear and the connecting gears were removed and placed in a separate, enclosed, force lubricated drive unit which was connected to the Banbury rotors by a mill-type coupling, thus obtaining a straight torque on each one of the rotors. This unit is now in operation and has performed very successfully.

The Banbury Method of Reclaiming

We have decided that it is practically impossible to overload a Banbury when the unit-type drive is used, and we are now building a #11 Banbury for operation at 20 and 40 r.p.m. using a 600/1200 h.p. motor with a 250% pullout torque, allowing for a peak load demand of 3,000 h.p. for the unit. This machine is to be used for the Banbury method of reclaiming scrap rubber. By this method we can take either completely vulcanized, partially vulcanized, or unvulcanized factory scrap rubber containing cloth, paper, cotton or rayon floc, or any other type of textile material, load it into the Banbury, and by the application of high mixing speeds and pressure devulcanize the scrap in an extremely short time to produce a high-grade reclaimed rubber at an extremely low cost.

When we talk about high pressure in the Banbury method of reclaiming, we mean pressure about ten times greater than normal for the standard Banbury. The regular #11 Banbury with a 11-inch air cylinder using 100 pounds' air pressure gives a pressure on the floating weight of approximately 15 to 20 p.s.i. We now use an extremely large air cylinder and an air pressure of 200 pounds, obtaining a pressure on the floating weight of approximately 150 p.s.i. I would like to stress this point since some Banbury users assume incorrectly that when 150 pounds' pressure on the floating weight is mentioned, we mean 150 pounds in the air cylinder; whereas we are actually specifying pressure in pounds per square inch upon the area of the floating weight. Of course, when this higher than normal pressure on the weight is used, it is necessary to have about twice the usual horsepower to drive the Banbury. For example, a standard #3A Banbury mixer for operation at 35 and 70 r.p.m. would have a connected horsepower of 150/300, but for reclaiming would have a connected horsepower of 300/600; similarly a #11 Banbury for operation at 20 and 40 r.p.m. as a regular mixer would have a 300/600 h.p. motor; while for reclaiming the motor would have to be 600/1200 h.p.

The major requirement for the Banbury method of reclaiming scrap rubber is the development of relatively high pressure on the batch in the mixer. If reclaiming is attempted in a standard machine with lower horsepower drive and lower pressure on the floating weight, very poor results will be obtained. On the other hand it is not necessary in mixing operations with natural or synthetic rubbers to have as high pressure on the batch in order to obtain satisfactory results. Although the special Banbury designed for reclaiming will do an excellent job of dispersing carbon black in rubber, the higher pressure on the stock would generate an excessive amount of heat, and the higher horsepower drive might still not be high enough to complete the mixing operation before the stock was damaged owing to the high temperatures developed.

Conclusions

In conclusion, I would like to point out again that one of the most important principles in the Banbury method of mixing is to arrange conditions so that the stock is quite stiff during the period that pigments are being dispersed in the rubber. Ample drive horsepower and pressure on the stock from above by means of the ram are necessary for proper mixing with the stocks of the consistency needed to insure good pigment dispersion.

THAT part of the Akron Rubber Group symposium on rubber machinery and processing of February 3, 1950, dealing with mixers and mixing is presented herewith. This part consists of the talk by D. A. Comes, of Farrel-Birmingham Co., Inc., entitled "Rubber Mixing Machinery—The Banbury," and the panel discussion questions and answers.

The talk by A. L. Heston, of National Rubber Machinery Co., on the subject of "Extrusion and Applications of Extruders" and the panel discussion on this subject appeared in our April issue.—EDITOR

D. A. Comes

Panel Discussion on Mixing

FOLLOWING the above talk by Mr. Comes many questions on mixers and mixing were answered by a panel of experts and Mr. Comes. C. A. Ritchie, B. F. Goodrich Co., chairman of the Akron Rubber Group, acted as moderator. The panel of experts was made up of the following men: George Bruggemeier, Firestone Tire & Rubber Co.; Paul Beebe, Goodyear Tire & Rubber Co.; A. W. Phillips, The General Tire & Rubber Co.; R. H. Wattleworth, Goodrich; all of Akron, O.; and P. Fay, United States Rubber Co., Detroit, Mich.

Q. What are the advantages and disadvantages and the mixing cycles of the straight *versus* the masterbatch method of compounding? Also, what are the advantages and disadvantages of the use of loose carbon black *versus* the GR-S black masterbatches in compounding?

A. Mr. Phillips. In my opinion the straight or direct method of compounding will result in longer mixing time per batch, but, over a long period of time and with a large volume of stock being processed, will show a lower mixing cost when compared with the masterbatch method. The direct mixed batch will develop a higher temperature and with a stock with a fast curing rate mixed in a #11 or #27 Banbury will require proper and adequate means for cooling the batch.

I am not unappreciative of the advantages of the masterbatch method of compounding, but I believe this method to be a more expensive method of obtaining the same end result. The lowest cost, high-quality mixing I have ever seen was done by the direct method in a #27 slow-speed Banbury followed by three 84-inch sheeting mills.

With regard to the use of loose carbon black as compared with the GR-S black masterbatches, the straight or direct method of compounding can be used more readily with the GR-S black masterbatch, and, in addition, greater cleanliness of the millroom is obtained, which is a very important item; no loose black is lost through the dust collecting systems; mixing is done at lower temperatures and in less time; a lower inventory of carbon black is required; and, in general, a more uniform mix is obtained with less trouble then when loose black is used. A still further advantage is that it is more difficult to make frequent changes in black content of a stock when using black masterbatch and this is a good policy in large-volume mass-production operations.

Q. Is there a trend in the rubber industry toward the use of heavier mixing equipment?

A. Mr. Comes. I think I have answered this question quite completely in my previous remarks. I might mention, however, that with the use of GR-S in volume in industry, heavier loads have been imposed on mixing equipment, and as a result heavier equipment has had to be designed, as evidenced by the #11 Banbury operating at 20 and 40 r.p.m. which now requires a 400/800 h.p. drive. Heavier machinery is being used because it provides greater production of better quality and at a lower cost.

Q. Is there a trend in the industry toward the use of Banburys operating at higher than normal speeds? What are the most practical mixing speeds?

A. Mr. Wattleworth. I don't believe the industry is likely to use Banbury mixers operating above the presently available normal speeds of 20, 30, and 40 r.p.m. except for special jobs requiring special-purpose equipment. The #11 Banbury operating at 20 r.p.m. is very well adapted for use with the hand batchout; whereas operation at 30 and 40 r.p.m. usually necessitates a mechanical means to take the stock away from the mills. With the type of production operations that will show increased economies with greater amounts of mechanization, the 30 and 40 r.p.m. speeds may be considered practical for Banbury operation.

In my opinion there are very few general-purpose stocks that cannot be mixed efficiently at 30 r.p.m. Personally, I am inclined to consider the 40 r.p.m. Banbury, special-purpose equipment for special jobs. At 40 r.p.m. the stock is mixed quickly, but often develops higher than normal temperatures in a rather short time. With the proper conditions, the proper compound, and the proper kind of arrangement for taking the stock away from the mill, there is, however, a definite place for the 40 r.p.m. Banbury in the rubber industry. My own preference is for the 20 or 30 r.p.m. Banbury where the stock is taken away from the mixer by hand.

Q. What are the latest developments in the field of automatic Banbury mixing?

A. Mr. Comes. Automatic Banbury mixing involves the loading of the ingredients into the hopper and the removal of the finished stock as it is dumped from the machine. The stock from the Banbury can be handled by a sheeting mill or a screw-type blending and mixing machine. The screw-type machine can convert the stock into pellets, which are very adaptable to automatic handling, or it can extrude the stock in the form of slabs.

We are working at the present time on a screw-type machine that we hope will be extremely well suited for almost any automatic mixing and handling operation. This new machine will refine, strain, pelletize, slab, or otherwise handle the stock as desired and will adapt itself to most production mixing schedules that would benefit by increased mechanization. The compound ingredients are fed into the hopper automatically from a conveyer belt. This type of equipment, however, may be rather expensive.

The prewar Ford company tire plant was an excellent example of automatic mixing and handling of stock. One man operating a $45,000 electrical control panel was supposed to run 12 #11 Banbury mixers. It was actually possible for the operator to keep eight Banburys running. The Ford plant was sent to Russia during the war, and I understand from the service man who set it up that now instead of one man operating 12 Banburys, 12 men operate one Banbury.

Q. What is the most satisfactory method for plasticating natural rubber or GR-S, for example, by the use of a single- or double-rotor Banbury or with a plasticator?

A. Mr. Bruggemeier. Of course the selection of a single-rotor Banbury, a two-rotor Banbury, or a Gordon plasticator depends upon which type of machine fits best into the most efficient and streamlined flow of materials that can be devised. The selection is also influenced by the type of rubber to be

processed. For each machine the amount of breakdown of the rubber or the plasticity desired after processing must be determined in terms of the time, temperature, and number of passes of the rubber through a given machine.

Q. What is the most satisfactory procedure or procedures necessary to obtain uniformly good dispersion of pigments in rubber or GR-S?

A. Mr. Beebe. In addition to the information on Banburys and pigment dispersion provided by Mr. Comes, I have a few additional comments on dispersion as affected by Banbury usage. It has been my experience that Banbury mixing of tire stocks at speeds up to 50 r.p.m. will provide satisfactory dispersion of pigments. Manufacturer's specifications for clearance between the rotor and the shell of a Banbury are given 3/16-inch, but personally I feel that when wear has increased this clearance to ⅜-inch, better results are obtained and continue to be obtained up to the point where the shell has worn out.

With regard to the amount of pressure on the floating weight of the Banbury mixer, I prefer a pressure of about 60 p.s.i. on 11-inch rams and about 125 p.s.i. on eight-inch rams. Higher pressures are also liable to cause trouble with the dust rings and thereby increase the amount of powders lost from the machine during mixing.

There is also the question of temperature and poor pigment dispersion which will often be encountered if the mixing is carried out at too low a temperature in the Banbury. I agree with Mr. Comes that the mixing action in the Banbury occurs between the rotors and the shell, and in order to obtain maximum shearing action on the rubber the rubber should adhere to the metal surface of the shell. If the stock does not adhere to the shell, the stock merely rolls ahead of the rotors, and only a kneading action is obtained. Rubber stocks will adhere better to a warm shell than to a cold shell. For example, it is preferable to use 90° F. cooling water in a Banbury mixer instead of 50° F. cooling water because the former permits the metal surfaces of the shell to operate at a somewhat higher temperature while at the same time cooling water at either temperature will generally remove the necessary amount of heat generated by the mixing.

Q. What is the most satisfactory method and means for controlling the uniformity of the mixing cycle in the Banbury for a given stock, an indicating and recording wattmeter, such as the Esterline Angus, or an indicating and recording temperature instrument?

A. Mr. Wattleworth. If the type of control desired is a check on Banbury operator's adherence to standard procedures for the order and time of addition of ingredients, then the wattmeter is the best instrument for this purpose because of the lag in the recording of the temperature of the stock in the Banbury with the temperature measuring type of instrument. In the past it was thought necessary to have a wattmeter record of each batch of stock from the Banbury, but the emphasis at the present time is more on the temperature of the stock at the end of the mixing cycle and even during the mixing cycle. In order to have a check on the workability and quality of a batch of stock it is necessary to have information on these mixing cycle temperatures obtained with the best instrument which is available.

Q. What is the best surface speed or speeds to use for the rolls of mixing and warmup mills?

A. Mr. Wattleworth. The surface speeds of the front rolls of the 60-inch and 84-inch mills are pretty generally governed by safety and convenience considerations for the mill operator. Approximately 75 feet a minute maximum for a 20-inch diameter roll and 100 feet a minute maximum for a 24-inch roll are the most practical front-roll surface speeds for two-roll mills, in my opinion. Of course a 26-inch roll may be operated somewhat above 100 feet a minute and a 22-inch roll under 100 feet a minute, but pretty generally practical operating speeds are within the above indicated range.

Q. What are the most satisfactory mixing procedures to use with stocks that have a tendency to scorch?

A. Mr. Fay. I doubt if this question can be answered directly or completely because the possibility of scorching is always present to a greater or less degree in practically all mixing operations in which sulfur is one of the ingredients.

Among the many factors to be considered, however, I would direct your attention to the following: (1) the order in which ingredients are fed into the Banbury; (2) the use of the most effective method of cooling the stock during mixing; (3) use of the procedure of adding sulfur at the last moment before discharging the batch from the Banbury; (4) use of the procedure of adding the sulfur to the rest of the batch on a mixing mill instead of during the Banbury mixing; (5) the maintenance of low discharge temperatures of the stocks; (6) the use of previously plasticized rubber in the mixing operation.

The question of the proper temperature that should be maintained comes up in practically all discussions on the mixing of rubber stocks, which indicates the importance of this factor. When stocks that have a considerable tendency to scorch are being used, it is important to keep the mixing temperature as low as possible, to use short cycles, and to work with small batches.

Q. What are the most practical mill roll settings to use for satisfactory mixing? Is the use of cocked mill rolls to be recommended for fast mixing?

A. Mr. Wattleworth. Mill roll settings should be established for batch of stock processed, and the size of the batch and the settings used depend upon the type of stock being mixed, its scorch characteristics, the amount of temperature developed during mixing, etc.

Most of the heat developed during mixing is removed through the mill rolls, and the thicker the band of stock around the front roll the more difficult it will be to remove that heat by means of the cooling water circulating through the rolls. It follows, therefore, that a stock with a maximum tendency to scorch should be mixed in a small batch with a thin band around the front roll and with a small bank of stock between the rolls.

When operating a sheeting mill with a Banbury mixer, it is even more important than with straight mixing that the mill roll settings be such as to keep the band of stock on the front roll at all times.

Cocked mill rolls are used at times with a strip feed mill in order to make the bank feed from one end of the mill to the other without having a man to do the work. A much better, safer, and more convenient way of accomplishing the same result is by use of a traveling strip knife that permits the stock to come free from the mill roll, i.e., the strip of stock is taken away from the mill back and forth across the width of the roll instead of depending on the cocked rolls for this operation. Improvement in the rate and quality of the dispersion of ingredients in mixing are not obtained by the use of cocked mill rolls, as far as my experience is concerned.

Q. What is the most satisfactory way to determine batch sizes for Banbury mixing?

A. Mr. Fay. This question is difficult to answer directly or completely, but the following factors are important in this connection: (1) scorch characteristics of the batch; (2) power demand of the stock during mixing; (3) form in which carbon black is handled, i.e., in bags or bulk; when handled in bags, it is customary to adjust the batch size so that bag quantities only may be used; (4) the size of the Banbury to be used.

I have taken from my files a formula which I believe was provided by the Farrel-Birmingham Co. in 1943 and may be used to determine the proper-size batch for the various sizes of Banburys. The formula includes the cubic inch capacity of the Banbury plus a constant assigned to each size Banbury. To determine the proper batch weight, multiply the specific gravity of the stock by the constant for the size of Banbury which is being used.

Banbury Size	Capacity, Cu. In.	Constant
9	11,443	264
11	15,469	372
27	34,144	816.66

It should be understood that this formula works best with new machines with minimum clearance between the rotors and the sides and is also to be used only as a guide in establishing the proper batch size. Under certain conditions batches much larger than those resulting from the use of the formula have been successfully run.

Q. What is the advantage in the use of the lower mill roll ratios which has been a recent trend in the rubber industry?

A. Mr. Wattleworth. There has been a trend in the rubber industry toward lower mill roll ratios, and that trend has been brought about by the reduced use of the two-roll mill for rubber breakdown or plastication and compounding. Some years ago a considerable number of 84-inch mills were occupied almost en-

tirely with break down and blending rubber, but with the increased use of Banbury mixers and higher-speed mixing in Banburys and the use of plasticizers for that type of work, two-roll mills are not used to the extent they had been previously used.

At present the two-roll mill is used mostly as a convenient means of handling stock after mixing in the Banbury, and, in general, when used only as a sheeting mill, the two-roll mill is not required to do the amount of work it formerly did when it was used to break down rubber. Understandably then, lower mill roll ratios may be used, less power is required, and the heat of mixing may be removed more completely if the mill is used in this more limited way. It is conceivable that even lower mill roll ratios might be used eventually.

Q. What are recent developments in the field of continuous mixing and warm-up equipment?

A. Mr. Bruggemeier. The future looks encouraging if the present development work on such type of new equipment continues or is accelerated. Of course in all continuous operations the rubber must be prepared in such form that it can be continually and automatically fed to the mixing or warming machine. This factor may limit large-scale adoption of such machines by the industry for some time.

At the present time several companies are attacking this problem both with laboratory and production size equipment. These new machines can be classified under six general headings as follows: (1) single screw; (2) twin screws with both screws operating in the same direction; (3) twin screws with both screws operating in different directions; (4) twin smooth rolls with the rolls totally enclosed and with a spiral scroll on the inside surface of the case; (5) the three-roll machine with the middle roll scrolled and partially enclosed in a smooth surfaced encasement; (6) the Farrel-Birmingham machine about which no details are available at the moment.

For blending and warm-up of stocks all of the above-mentioned machines have some merit, but possible limitations are again connected with the problem of temperature control. Although little work has been done up to the present time on the problem of continuous mixing of rubber stocks, it would appear that certain of the machines should have advantages over the others as far as mixing is concerned.

An interesting observation is that all of the above-mentioned new equipment, with some question as to the Farrel-Birmingham unit, can function as extruders, so that eventually the compounder may be able to formulate so that blending, warm-up, and extrusion may be accomplished in one operation, which would be a wonderful development. Any such new development would have to be a very outstanding one, however, in view of the tremendous investment in the presently installed Banburys and mills. It is doubtful if any new-type continuous mixing equipment will be adopted generally until it has really proved its ability to provide cheaper and more efficient mixing and processing and will pay for its installation in savings, as compared with existing equipment, in a reasonably short period of time.

Q. What is the most satisfactory method for handling sticky stocks such as heavily loaded Butyl rubber in the Banbury or on mixing mills?

A. Mr. Fay. As a result of a discussion of this question with men who are closest to mill room processing problems in our Detroit plant, the following suggestions are made: (1) It is necessary to determine the importance of the order in which ingredients of a given stock are introduced into the Banbury. Some experimentation may be required. (2) Use a large nip between the rolls of the mixing mill. (3) Keep the mill rolls smooth and clean. Rolls that are scored, rough, or pitted will cause lots of trouble when the stock is being removed from the mill. (4) Get the stock off the mill as soon as possible at the end of the mixing cycle. (5) If the same mills are used continuously for mixing Butyl stocks, a glaze forms on the surface of the rolls which reduces the tendency of the stocks to stick to the mill rolls. (6) A temperature differential between the mill rolls is considered a factor of major importance.

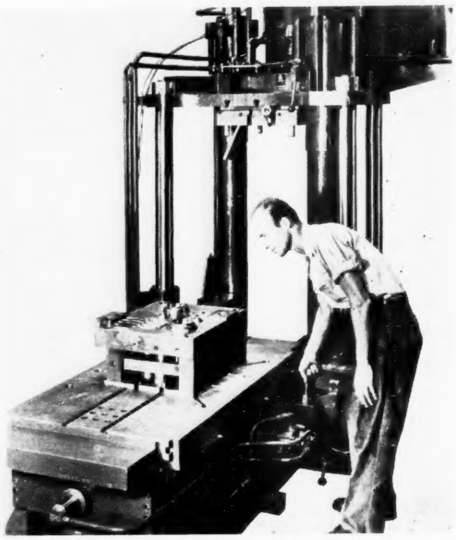
Q. Discuss the advantages of "upside-down" mixing *versus* conventional mixing.

A. Mr. Comes. "Upside-down" mixing is the procedure by which all the ingredients of a batch are introduced into the Banbury at the same time, and the floating weight is immediately applied, thus developing a high power input into the batch at the start of the mixing cycle. I have seen a #11 Banbury use 900 h.p. during the first minute of "upside down" mixing. Improved dispersion of pigments is the result of the high power input required by the stiff consistency of the batch.

When all the ingredients of a batch are thrown together in the Banbury at one time, the rubber breaks up into small pieces heavily coated with the pigments, and when these pieces form a solid mass, maximum work is done on the mix because maximum power is required.

I do not recommend "upside down" mixing for universal use in the rubber goods plant. Many times just as good results may be obtained in the same period of time by adding the ingredients in a more regular manner so that the rubber or other base material may absorb the fillers more slowly and with much less strain on the equipment.

Mr. Beebe mentioned the value of reasonably high temperatures on the surface of the inside of the Banbury shell so that the rubber would adhere more readily, and greater shearing action would be developed. "Upside down" mixing breaks the mass into a number of rough, coarse-surfaced parts which create much friction in passing along the inside of the shell of the Banbury, and this friction necessitates a large amount of horsepower to keep the batch mixing and produces in turn an excellent dispersion of the pigments in the rubber.



Lester Engineering's New Die Tester, Showing Lower Platen Moved Down and Out on to Table

Die Testing Machine

A NEW die testing machine, which opens and closes dies with such accuracy that the parting line can be matched perfectly before the die leaves the tool room, has been announced by Lester Engineering Co., Cleveland 13, O. Use of the machine eliminates the need of expensive and possibly dangerous work in matching parting lines, "bluing in" a die, and checking slides and moving cores.

In operation, the two halves of the die are clamped to the two machine platens. The bottom platen moves down and then horizontally. The die is then at a convenient height and out in the open so that it can be easily reached and worked on to correct any faults. It can then be quickly moved in and up in perfect alinement for checking. The machine has its oil cylinders located inside of two of the vertical columns. The bottom platen is movable; yet there is no need of a pit to accommodate an oil cylinder. Although the vertical travel is 36 inches, the machine will fit under a 10-foot ceiling. Die table size is 28 by 58 inches; minimum die height is 14 inches; locking pressure, 50 tons; daylight opening, 50 inches; horizontal stroke of die table, 52 inches; size of motor, 10 h.p.; machine weight, about 15,000 pounds; and machine dimensions, 112 inches high, 68 inches wide, and 136 inches long.

EDITORIALS

The Problem of Improved Grading and Specifications for Natural Rubber

IT IS hardly a new or original observation that there has been much consumer dissatisfaction with the natural rubber delivered to the United States since the end of the war. Grading to the official crude rubber type descriptions of The Rubber Manufacturers Association, Inc., has been done poorly; packaging has been inadequate; handling and shipping inefficient; on receipt in the country the rubber has contained too much dirt and foreign matter, and its plasticity and cure rate have shown wide variations.

Numerous and vigorous complaints coupled with the threat of the loss of an even greater part of their market in the United States to synthetic rubber have spurred natural rubber producers to an intensive research and development program for the improvement of the quality and grading of their product. In fact, French plantation interests are now marketing a small amount of a "specification" rubber in this country; such rubber is of current standard, but bearing marks enabling the user to recognize its plasticity and rate of vulcanization properties.

The British rubber producers sent the director of their research association to the United States in 1948 to learn the problems and desires of the American consumer, following which a research program aimed at solving some of these problems was initiated. Some of the results of this work were revealed at the meeting of the Division of Rubber Chemistry, A.C.S., in September 1949, held in Atlantic City, N. J., and further results were presented at the most recent meeting of the Division in Detroit, Mich., during the week of April 17.

A meeting of the new subcommittee on crude natural rubber of Committee D-11 of the American Society for Testing Materials was also held in Detroit during the week of April 17 and was attended by about 30 representatives of the rubber goods manufacturing companies and a representative of the British Rubber Producers Research Association. It was revealed that plantations interests in Sumatra have ordered an extensive amount of equipment for testing rubber and that graded rubber from that area may be available in the near future. Similarly it was indicated that rubber more accurately graded and prepared to meet technical specifications would be forthcoming from Malaya in the near future, *if* American consumers would let the producers know more accurately just what type and quality of rubber they wanted.

The discussion at this ASTM subcommittee meeting showed that, unfortunately, American consumers are in the position of having complained at great length about the quality and variability of crude natural rubber, but do not now have specific recommendations as to the rubber they want, particularly with regard to technical specifications. It was agreed, however, that American consumers want cleaner rubber in all grades.

The ramifications of the problem of improved grading and technical specifications for crude natural rubber are many and varied. It does appear, however, that one approach that might be taken by the fabricating industry and its technologists in this country would be on the basis of making certain immediate recommendations along lines where the machinery for their implementation is already available or can easily be agreed upon and to work out with the natural rubber producers further recommendations where time-consuming research and development work is still required.

In the first category is the need of more rigid adherence to the existing RMA-type descriptions by producer, packer-dealer, carrier, importer-dealer, and even by the consumer. Legislation proposed in Malaya during the last year to require the licensing of dealers in natural rubber in that country is a step in the right direction.

An improved and more efficient bale marking system as outlined in the March, 1950, issue of India RUBBER WORLD, by J. C. Roberts, of the Firestone Tire & Rubber Co., is another "must" for producers and dealers.

Shipping and handling procedures at both the port of loading and unloading require improvement and policing, and for progress in this direction the cooperation of the steamship companies should not be difficult to obtain, as indicated in an article on natural rubber packaging by H. W. Courtney in the July, 1948, India RUBBER WORLD.

In the second category, that is, the development of technical specifications for the numerous grades of natural rubber, the producers have been particularly active of late in assembling data on the proper method of sampling, the extent of the variation of plasticity and rate of cure of lots of rubber, and have been trying to decide on the most accurate and reproducible compounds and test methods to use. Cooperation in this project from the ASTM subcommittee is now assured, and, in addition, another subcommittee has made progress in developing standard samples of rubber and compounding ingredients for such testing and evaluation work. The procurement of a "standard" sample of natural rubber is this group's biggest hurdle at the present time.

Much needed and long overdue improvement in the quality and grading of crude natural rubber appears likely in the near future as the result of the work of producers abroad and consumers in the United States. The problem is so complex and involves so many commercial interests among producers, dealers, shippers, importers, and consumers, that a top-level coordinating committee, possibly sponsored by the International Rubber Study Group, would seem to be highly desirable in order to give added impetus to the important work already under way on this problem.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Royalite—a New Tough Thermoplastic[1]

E. C. Van Buskirk[2]

APPROXIMATELY 10 years ago a new product was born into the plastics family. This new product, United States Rubber Co.'s Royalite, has now grown to full stature and finds itself already holding an increasingly important position in the field of thermoplastics. The word "new" is used in conjunction with Royalite since its broad release to industry is recent.

When Royalite was born in the laboratory, the far-reaching applications of the product were not immediately realized. The men in the laboratory knew that they had discovered a new compounding technique along with a material that was outstanding in being extremely tough, but neither hard nor brittle. At about the same time there developed a wartime need of a tough, stiff board to support a self-sealing fuel cell. The main requisite for the board was that it must "shoot," i.e., must take the impact of a caliber .50 bullet without shattering or flowering. The new thermoplastic was ideal for this purpose. Known as "Es-Es" at that time, this board represented the first application of the material now called Royalite.

As development work progressed, it was found that Royalite could be formed and drawn easily without loss of physical properties. This fact, along with the necessary dielectric qualities, led to the use of Royalite in radar housings. With increasing interest in the new material, pilot-plant operations were expanded to the point that finally a factory was acquired in Chicago, Ill., for the manufacture and fabrication of Royalite.

With this very brief background of the history of the growth of Royalite, it will be of interest to examine the general composition of this product and the manufacturing steps involved in its production and fabrication. Royalite is part plastic and part elastomer, a compound of a butadiene-acrylonitrile copolymer and an acrylonitrile-styrene copolymer. By varying the ratios of these copolymers we can change the physical properties of the product, and, as a result, several series of compounds are available. To the finished compound may be added pigments and various modifiers, thus again providing a number of possibilities. When a fabricator has a special job involving some volume, it is possible to engineer the Royalite for the specific job.

Sheet Production

The preparation of the sheet of Royalite begins with the blending of compounding ingredients in a Banbury mixer, followed by the calendering of thin sheets of the stock. The calendered sheets are then plied in a press to the desired thickness and embossed in a satin or glossy finish, as required. These sheets are then ready for thermoplastic drawing or forming.

It is possible to supply these sheets in a variety of beautiful finishes and colors. This feature is one of the most important of Royalite, for we are dealing with a material that is not only beautiful from a decorative and design standpoint, but also a material having remarkable physical properties.

Drawing and Forming

Of particular interest to fabricators are the methods used to form and draw Royalite. A major attraction is the ease of manufacture and the low cost of tooling. The methods involved are all well known to fabricators of thermoplastics. To enumerate briefly, they include the use of male and female molds; the use of vacuum with a female cavity and clamping rings; the use of a plug and diaphragm; the use of a plug and a ring (see Figure 1); and other methods standard with the industry.

When forming Royalite, the sheet is heated to approximately 300° F. At this point the sheet is very flexible and rubbery and is ready for forming or drawing. If the fabricator is interested in using vacuum, 26 inches of vacuum on a conventional snap or straight vacuum technique may be used. When a plug and a ring are used, the male member may be drilled for vacuum to permit the forming of intricate parts. After forming, the material is permitted to cool below its deformation point (for example, to approximately 125° F.) before being removed from the forming fixture. If a more speedy cycle is required, the formed parts may be cooled with air or water.

After removal from the form, the only remaining operation is to trim the product to the final dimensions. In this connection it can be noted that Royalite may be cemented, riveted, drilled, sawed, turned, or cold punched, and may be buffed or polished to a desired finish. It must be emphasized that Royalite lends itself to fabricating techniques already well established; there is nothing new to learn except to accept the simplicity of its handling methods.

Physical Properties

A study of the physical properties of Royalite immediately suggests the type of application suitable for this new thermoplastic. It is apparent that the material combines two very important qualities; not only is Royalite a decorative plastic, but it is also a product that may be used functionally as a stress member. It is an engineering material that possesses the beauty of permanent finish.

Plastics are used in many cases for their decorative beauty although, because of physical limitations, unsatisfactory from an engineering standpoint. Many items, for example, are made from wood with a plastic finish or decorative surface layer. This problem does not exist with Royalite.

The general specifications of three standard series of Royalite stocks are shown in Table 1, which lists typical values for each series. These specifications will vary somewhat as the pigmentation and surface finish are changed. In addition to these series, Royalite is also made in special flexible and expanded forms.

A study of the data demonstrates the suitability of Royalite for functional use. The impact strength is of particular interest to engineers, since Royalite products will withstand abusive use and even hammer blows. There is very little danger of breakage should the finished product be dropped or misused. As mentioned previously, Royalite is also available in expanded form, with densities as low as six pounds per cubic foot. This expanded material should find use in flotation equipment, radomes, and other applications re-

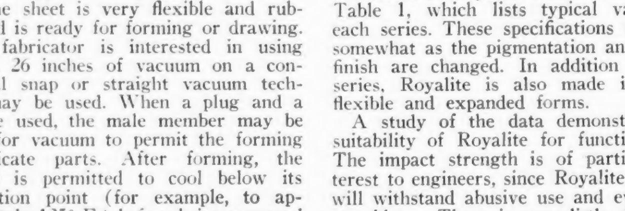


Fig. 1. Formed Royalite Part Being Removed from Plug and Ring Mold

[1] Presented before New England Section, Society of the Plastics Industry, Inc., Manchester, Vt., Oct. 14, 1949.
[2] United States Rubber Co., Mishawaka, Ind.

quiring a structural member of light weight. Expanded Royalite also possesses resistance to grease and oil, erosion, and moisture absorption; has a low thermal conductivity; and has dielectric properties suitable for radar housings.

TABLE 1. GENERAL SPECIFICATIONS OF STANDARD ROYALITE STOCK

	Test Temp., °F.	200 Series	300 Series	400 Series
Rockwell "R" hardness	70	100	85	55
Specific gravity	70	1.08	1.07	1.05
Tensile strength, p.s.i.	70	4,800	4,000	2,500
Elongation at fracture, %	70	30	60	75
Modulus of elasticity in tension, p.s.i.	70	280,000	230,000	140,000
Flexural strength, p.s.i. (modulus of rupture)	70	7,500	6,500	3,000
Modulus of elasticity in rupture, p.s.i.	70	210,000	190,000	110,000
Impact strength (notched Charpy), ft. lbs./in. notch				
	70	5	15	12
	20	1	5	11
	0	0.8	1.5	10
	—10	..	..	4
	—20	..	..	1.5
Moisture absorption (24 hrs. immersion), %	70	0.3	0.4	0.5
Thermal conductivity, Btu/hr./sq. ft. /°F./inch	70 212	1.0	1.0	1.0
Heat distortion point (at 66 p.s.i. stress), °F.	..	185	170	155

In addition to the properties enumerated thus far Royalite also possesses many others of interest. The material is resistant to stains, grease and oil, and most alkalies and acids; waterproof, mildew-proof, and vermin-proof; odorless; warm to the touch even at low temperatures; washable; and light in weight. Although generally resistant to most organic materials, Royalite is not resistant to ketones or acetates.

Applications

When choosing a plastic for a definite product, the fabricator must be discerning. For example, it would be very simple to form an ashtray from Royalite; a wood die and very simple vacuum set-up could be used at a low tooling cost. Practically 100% perfect products could be assured, but why use Royalite for an application of this nature? A glass ashtray is perfectly satisfactory even though it will break when dropped. For most uses of ashtrays, therefore, the physical properties are of secondary importance.

On the other hand, when one discusses a product such as a typewriter case, glass would be entirely out of the question. A typewriter case shell can be drawn from Royalite by the same simple method that could be used to form an ashtray. A Royalite typewriter case, as shown in Figure 2, has beauty of finish along with the physical properties required by a product of this type. A typewriter case takes a good deal of abuse and requires the use of a material having engineering properties. The selection of Royalite for such a product, therefore, is a wise choice.

It is particularly in such applications that Royalite is outstanding. Products that have been and are being made of Royalite include motion picture projector cases; luggage; cases for portable radios (see Figure 3); station-wagon roof rails; bowling-alley return posts; sun helmets; golf bag bottoms; tote boxes; billiard gulley tubes; refrigerator strips, panels, and food trays; instrument cases; and many others.

Fig. 2. Royalite Typewriter Case Doubles as Overnight Bag When Typewriter Is Removed

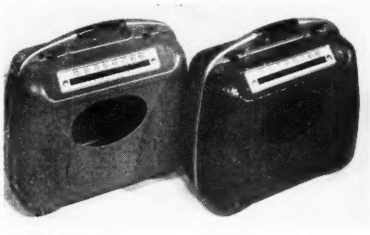


Fig. 3. Royalite Cases for Portable Radios

In most cases the nature of the product specifies the material to be used, and the material must meet the specifications. Laboratories are constantly working to invent and develop plastics products to meet the fabricator's every need. Royalite is believed to be in a class almost by itself in filling a gap in the materials available to the fabricator for engineered use. It is only by engineering a product with the right material that the consumer can be satisfied and new markets can be exploited. Royalite is representative of a material that has been engineered for the fabricator.

Summary and Conclusions

Summarizing briefly, the salient points concerning Royalite are as follows: (1) ease and low cost of fabrication; (2) beauty of color and finish; (3) outstanding physical properties; (4) use of conventional drawing and forming techniques, with greater ease than found in other thermoplastics; and (5) fills a gap in materials available to the fabricator. Here is a thermoplastic that is both decorative and functional.

Laboratory work will continue to expand constantly the potentialities of this new tough thermoplastic. We believe that Royalite has found its place in the great plastics industry and will continue to grow with the industry.

SPI Pacific Coast Section Holds Two-Day Conference

APPROXIMATELY 250 members and guests attended the seventh annual Spring Conference of the Pacific Coast Section, The Society of the Plastics Industry, Inc., held on March 2-4 at the Hotel Del Coronado, Coronado, Calif. The program included two days of technical sessions and dinner and luncheon meetings; while a separate program was enjoyed by the 70 wives attending the Conference. A golf tournament was held on the morning of March 4 at Rancho Santa Fe Golf Club, Rancho Santa Fe, and the remainder of the day was given over to sightseeing.

Opening Session on Thursday, March 2

The morning technical session, presided over by W. F. Roberts, Monsanto Chemical Co., featured the presentation of two talks and was followed by an open discussion. James S. Wilson, Watson-Stillman Co., spoke on "Equipment for Large Injection Molding"; while Sanford E. Glick, Monsanto, discussed "Industrial Applications for Plastics."

Mr. Wilson stated that the fundamental concept of the injection molding machine has not changed materially since the Isoma machine built in 1933. The capacity has been increased to 40-60 ounces per shot, and a 200-ounce machine will be in production in the near future. The injection cylinder, the most important part of the machine, should exert a pressure of 20,000 p.s.i., although many molders use pressures of 14,000-16,000 p.s.i. in actual production. Calrod heating units have proved satisfactory, and the cylinder and torpedo must be chrome plated. Preplasticizing chambers are generally used on large machines, but are now being applied also to small machines. The speaker concluded by stating that the future size of injection molding machines is limited only by their ability to pay for themselves.

Mr. Glick noted that the domestic consumption of plastics per capita was 0.4-pound in 1928, 10.9 pounds in 1948, and is estimated at 16.1 pounds in 1953. The use of polystyrene plastics has risen from 100,000,000 pounds in 1947 to 180,000,000 pounds in 1949. In the past 14 years polystyrene consumption has increased 250%, while the price of the molding material has dropped by 50%. The speaker concluded with a discussion of plastics applications, using polystyrene as his example.

The luncheon session was held in the Hotel's Coronet Room with Kenneth R. Mergen, Crest Molded Products, Inc., presiding. Conference Chairman Paul Rodriguez, *Plastics Industry*, gave a brief welcoming address, and William T. Cruse, SPI executive vice president, spoke on "Plastics Review and Preview." Mr. Cruse stated that plastics have grown to a billion-dollar industry, and that many problems have arisen with this growth. The SPI is working on these problems, and the speaker reviewed some of the Society's work in publishing financial surveys of the industry, the pension problem, union contracts, informative labeling, and other problems.

W. B. Goldsworthy, Industrial Plastics Corp., presided over the afternoon technical session, which featured presentation of the following papers: "Preformed Low-Pressure Molding in Reinforced Plastics," S. M. Fingerhut, Zenith Plastics Co.; "Reinforcement for Reinforced Plastics," C. E. Bacon, Owens-Corning Fiberglas Corp.; "Rigid Vinyls," G. E. Field, B. F. Goodrich Chemical Co.; and "Alkyd Molding Compounds Come of Age," M. H. Bigelow, Plaskon Division, Libbey-Owens-Ford Glass Co. (paper read by Henry Devore).

Mr. Fingerhut said that with ordinary hand laying-up methods the cost of reinforced low-pressure molded laminates has been too high. A method has been developed whereby a felting process is used

to preform the fibers with a small amount of resin, and the formed part dried in an oven. This preform is then molded in a regular press to give the desired product with a minimum of hand labor.

Mr. Bacon noted that while the cost of filled resins was $1.75 in 1942, it will be 27¢ a pound in a few years because of new techniques. Some of the fillers used in reinforced plastics include aluminum silicate, asbestine silica, and china clay, and they are used in ratios as high as 40 parts per 100 parts resin. These fillers also contribute to the final finish of the part in addition to providing toughness and strength.

Mr. Field noted that a relatively small percentage of vinyl is used in rigid moldings despite their excellent properties and extensive use in coatings and elastomeric compounds. Domestic molders declare that rigid vinyls cannot be extruded or injection molded satisfactorily, although many European molders are performing such operations with vinyls made in the United States. Much work is being done to improve the processability of rigid vinyls, and Goodrich Chemical is now offering Geon 400 x 65 which, while not the ultimate, gives greatly improved processing with almost no loss in physical properties.

Mr. Bigelow's paper noted that three machines for injection and compression molding of Plaskon 420 are now being developed. Thus the plastics industry is supplied with not only a material that is fast molding, but machines designed specifically for handling such a material. A new product, Plaskon 411, has been developed and is supplied as a putty for special electrical applications involving extremely low pressures in molding.

The annual banquet took place in the evening. L. N. West, Wilson & Geo. Meyer & Co., acted as toastmaster, and J. D. McDonald, McDonald Mfg. Co., gave a "Tribute to Western Plastics Pioneers." After-dinner speakers were Horace Gooch, Jr., Worcester Molding Co. and SPI president, who spoke on "1950—What It Means to the Plastics Industry," and G. H. Hall, California Institute of Technology, whose topic was "The Story of Palomar."

Program for Friday, March 3

The morning technical session, presided over by J. R. Turnbull, Monsanto, included a panel discussion on informative labeling and two talks: "Planning for 1950," Mr. Turnbull; and "Employer-Employe Relations," H. C. McClellan, Merchants & Manufacturers Association of Los Angeles.

A. L. Ruddock, Dow Chemical Co., acted as moderator at the discussion on informative labeling, and panel members included F. G. Berlin, Plas-Tex Corp.; Gordon Brown, Bakelite Division, Union Carbide & Carbon Corp; A. J. Carlson, Automatic Plastic Molding Co.; G. H. Clark, Formica Corp.; and L. R. Coombs, Lighting Specialties. The panel concluded that the producer must see that his product is made of the proper material and is functionally correct and then use an informative label to acquaint the consumer with the proper techniques for handling and maintaining the usefulness of the product. In addition, the label should give the generic name of the plastic, rather than its chemical name.

The luncheon session, with E. N. Huling, Wilcox Plastics, Inc., presiding, was highlighted by a talk on the work of the FBI by F. H. McIntire, in charge of the Bureau's San Diego office. Luncheon was followed by the Pacific Coast Section's business meeting, and the remainder of the afternoon was given over to individual discussions. A cooperative cocktail hour, sponsored by some 25 materials and machinery suppliers, was held in the late afternoon, followed by dinner and an evening of dancing and entertainment.

Plastics Problems before SPE Section Sessions

A TALK on "The Nature of Plastics," by William J. Connelly, Bakelite Division, Union Carbide & Carbon Corp., featured the April 19 dinner-meeting of the New York Section, Society of Plastics Engineers. Held at the Hotel Shelburne, New York, N. Y., the meeting was attended by 45 members and guests.

Mr. Connelly's talk was quite brief and served as a prologue to the showing of a sound-color film on plastics made by Bakelite, Ltd., of England. The plastics industry must now engage in selling practices, the speaker stated, and an educational program is needed to acquaint other industries with the properties and advantages of plastics. The film was of the educational type, but instead of the conventional approach to the subject, it stressed plastics as being man-made materials. Molecular models were used to show the relation between plastics, rubbers, and resins, and the building up of plastics molecules depicted by models and scenes of laboratory polymerization techniques.

A brief business session preceded the talk, with reports heard from Treasurer George Baron, Ideal Plastics Corp.; Membership and Attendance Committee Chairman Bob Boucher, Durite Division, Borden Co.; 1951 National Conference Co-Chairman Stanley Bindman, Gemloid Corp.; and Program Committee Chairman, G. Palmer Humphrey, G. P. Humphrey Plastics. Table favors were distributed through the courtesy of Ardee Plastics Co., and the meeting closed with a drawing for a door prize contributed by Empire Brush Co.

Newark Section Hears Quackenbos

A talk on "Recent Advances in Testing of Plastics," by H. M. Quackenbos, Jr., Bakelite Division, Union Carbide & Carbon Corp., highlighted the April 12 meeting of the Newark Section. Approximately 55 members and guests attended the meeting, which was held at the Military Park Hotel, Newark, N. J., and preceded by a cocktail hour and dinner.

The need of a knowledge of the mechanical properties of its materials is universal in every industry, Mr. Quackenbos stated. Tensile strength and impact tests were originally thought to be sufficiently definitive, but in the 1920's came the realization of the need of further tests, such as creep, water absorption, etc., and recognition of the importance of testing conditions, such as temperature and humidity. Tensile strength and flexural strength results are usually of little importance, since the notch sensitivity factor and the time of loading have marked effects on the test results. The long-time strength of thermoplastics is usually one-fifth to one-tenth that of the short-time strength; while the long-time strength of thermosetting plastics is about one-third the short-time strength.

The modulus of elasticity is a measure of stiffness, and a change in modulus of $\pm 50\%$ may often be of little importance for service considerations, the speaker said. Similarly, the impact strength test was thought to be definitive, but its results do not take into account the energy dissipated in the machine, the effect of the Izod notch, and other factors. Flexural strength gives a better index of impact resistance, the speaker declared, although the Charpy impact test is suitable for use with thermoplastics. The water absorption test is also faulty since the 24-hour standard test gives results that often do not correlate with long-term tests or indicate the magnitude of final water absorption.

Mr. Quackenbos classified tests from the design, special type, and quality control viewpoints. Design tests, in order of decreasing importance, include impact strength, notch sensitivity, water constants, creep, flexural strength, tensile strength, and modulus of elasticity. Special tests include brittleness, thermal conductivity and expansion, and dampening effect; while quality control tests include tensile strength, flexural strength, Izod impact, and 24-hour water absorption.

Kauth Speaks on Plastic Adhesives

The Rochester Section, SPE, held a regular dinner-meeting on March 20 at Towne Tavern, Rochester, N. Y., with some 27 members and guests attending. Speaker of the evening was Henry J. Kauth, president of Viking Resin Products Co., who discussed the bonding of plastics to themselves, other plastics, and to other materials, including wood and ceramics.

After a brief review of the applications and misapplications of various basic cements, Mr. Kauth discussed mechanical and polar-type bonds and the desirability of obtaining both types where possible. The effect of molecular structure on adhesion was then considered, with the speaker pointing out that thermosetting resins form infusible bonds; while thermoplastic resins, with their linear molecular structures, do not form infusible bonds. The talk concluded with a description of methods for selecting and applying the correct adhesive for a particular job.

Chicago Hears About Polystyrene Coloring

A talk on "Dry Coloring of Styrene Molding Powder," by Sanford E. Glick, Monsanto Chemical Co., featured the April 12 joint dinner-meeting of the Chicago Section, SPE, and Midwest Chapter, SPI. Approximately 75 members and guests of the two groups attended the meeting, which took place at the Builders' Club, Chicago, Ill.

Mr. Glick's talk was similar to the one he gave before the March 15 meeting of the New York Section, SPE, reported in our April issue, page 65. The meeting concluded with sound films on golfing, tarpon fishing, and pheasant hunting.

Bristow, Film Presented at Buffalo Meeting

Approximately 60 members and guests of the Western New York Section (formerly the Buffalo Section) attended a regular dinner-meeting on March 17 at the Park Lane Restaurant, Buffalo, N. Y. Speaker of the evening was Jack Bristow, Batton, Barton, Durstine & Osborn, Inc., whose topic was "How to Hunt Ideas."

Mr. Bristow's talk, illustrated with

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Scientific and Technical Activities

Good Attendance at Detroit A. C. S. Rubber Division Meeting

THE fifty-sixth meeting of the Division of Rubber Chemistry of the American Chemical Society, held at the Book-Cadillac Hotel in Detroit, Mich., April 19-21, as part of one of the "divided" meetings of the parent society, attracted a very good attendance of about 650 members and guests to the technical sessions and other activities of the Division.

A luncheon-meeting of the 25-Year Club of the Division on April 19 under the chairmanship of E. V. Kvet, Baldwin Rubber Co., was featured by a record attendance of 140 members of this relatively new group within the Rubber Division. In addition to Mr. Kvet, the head table at this luncheon was composed of F. W. Stavely, of Firestone Tire & Rubber Co. and chairman of the Division; A. A. Somerville, R. T. Vanderbilt Co. (substituting for E. B. Curtis of the same company who was unable to be present); C. R. Haynes, Binney & Smith Co. and secretary of the Division; and C. C. Davis, Boston Woven Hose & Rubber Co., editor of *Rubber Chemistry and Technology*, who will receive the Goodyear Award of the Division for 1950 at the Cleveland, O., meeting in October.

Mr. Kvet announced that the chairman for the meeting of the 25-Year Club at the Cleveland meeting would be R. P. Dinsmore, Goodyear Tire & Rubber Co.

The Technical Sessions

The technical sessions got under way at 2:00 p.m. on April 19 with Chairman Stavely presiding. Abstracts of the papers presented appeared in the March issue of India RUBBER WORLD, pages 686-692.

The paper on "Some Problems Involved in the Grading and Testing of Natural Rubber. Part II. Mastication and Compounding," by workers of the British Rubber Producers' Research Association and given by L. Mullins of that organization was of more than usual interest to Division members and guests. Mr. Mullins stated that graded rubbers of certain viscosities will be available in the near future from Malaya. The Mooney viscosimeter was favored over the dead-weight type of instrument for plasticity determinations, it was said.

W. K. Taft, University of Akron, Government Evaluation Laboratories, in a paper on "Effect of Air on Banbury Breakdown of Low-Temperature GR-S Polymers" by himself and others, revealed the beneficial effect of measured volumes of air introduced under the rotors of the Banbury in plasticizing "cold rubber" so that breakdown could be made in about the same time as for regular GR-S without extra air.

The series of papers on the subject of "The Tetramethyl Thiuram Disulfide Vulcanization of Extracted Rubber" by A. E. Juve, David Craig, W. L. Davidson, and others at The B. F. Goodrich Co. research center, was also of very great interest to those present at the technical sessions and elicited commendations from the floor as to the value of this work and its importance as a contribution to the literature of rubber chemistry and technology. By a special agreement with the Society these papers will be published in the *Journal of Polymer Science*.

In connection with the paper entitled, "Recent Developments in GR-S Latex Polymerized at Low Temperatures" by H. S. Smith and others of United States Rubber Co., it was said that more satisfactory material for rug backing and foamed sponge could now be produced for the first time with GR-S latex.

W. E. Mochel and J. B. Nichols, E. I. du Pont de Nemours & Co., Inc., provided interesting data on the molecular weight and molecular weight distribution of Neoprene Type W in comparison with low temperature GR-S, regular GR-S, and other neoprenes.

Two papers on carbon blacks and their use in the preparation of GR-S black masterbatches also received favorable attention. The first was "A Study of the Aqueous Dispersion Characteristics of Carbon Blacks" by E. M. Dannenberg and K. P. Seltzer, Godfrey L. Cabot, Inc., and the second was "New Developments in Masterbatching Carbon Black with GR-S" by J. W. Adams, W. E. Messer, and L. H. Howland of U. S. Rubber.

Mention should also be made of the two papers by the Firestone company on the subject of the reinforcement of elastomers, the first entitled "The Mechanism of Reinforcement—The Nature of the Interaction between Carbon Black and Polymer in Cured Elastomers" by R. S. Stearns and B. L. Johnson, and the second, by Ernst Schmidt, on "Effect of Colloidal Non-Carbon Pigments on Elastomer Properties."

The large attendance at all of the technical sessions of the Division was a tribute to the caliber of the papers presented and the work of the authors and the papers review committee of the Division in preparing and selecting the papers for presentation.

The Business Meeting

At the business meeting of the Division on the morning of April 20, Chairman Stavely first asked the members to stand for a moment of silent tribute to two members who had died in the course of the last year. These two members were R. R. Miller, Detroit, and G. W. Sneed, St. Louis.

The report of the membership committee under the chairmanship of L. V. Cooper, Firestone, showed that although 133 members in the United States and 89 abroad had to be "cut-off" the mailing list as of February, 1950, a total of 95 new members and 35 associate members had been added to the list as a result of the work of this committee this year. Membership of the Rubber Division now totals 2,044, of which 1,774 are regular and 270 are associate members. In 1951 a membership card will be issued to all those belonging to the Rubber Division, it was announced.

The bibliography committee, J. McGavack, U. S. Rubber, chairman, reported that another edition of the "Rubber Bibliography" will be published during the current year. The work of preparing these editions has progressed to the point where they may be prepared at a more rapid rate in the future, it was said. A tribute to the importance of the work being done by this committee was made by Dr. Stavely.

The report of the treasurer, C. W. Christensen, Monsanto Chemical Co., stated that funds of the Division were at about the same level as during the past two or three years, but the rising cost of publication might cause a reduction in available funds in the near future. A report of the financial needs of the Division is to be prepared by a committee under the chairmanship of H. E. Outcault, St. Joseph Lead Co.

The library committee, B. S. Garvey, Jr., Sharples Chemicals, Inc., chairman, reported on the need of a full-time librarian for the Division library at the University of Akron. All library service work has been a voluntary contribution by the University of Akron and various rubber companies up to the present time. The University has offered to pay $125 a month for the services of a full-time librarian if the Rubber Division will guarantee $100 a month also. It was said that an effort would be made to obtain this $100 a month from the Rubber Manufacturers Association rather than taking this amount from the reserve funds of the Division. It was mentioned that the Spence library, which had been offered to the Division previously, could become a part of the Division library as soon as the services of a full-time librarian were obtained.

The new by-laws of the Division prepared by a committee headed by S. G. Byam, du Pont, which were distributed to the members during February, were approved by a unanimous vote of the members present at the business meeting. Dr. Stavely paid tribute to the work of Mr. Byam and his committee in preparing the new by-laws and working for their adoption by the Division.

The report of the nominating committee, S. M. Cadwell, U. S. Rubber, chairman, was presented by W. W. Vogt, Goodyear. J. H. Fielding, Armstrong Tire & Rubber Co., the present vice chairman, will become chairman of the Division at the end of the present year.

Nominated for vice chairman were Waldo L. Semon, Goodrich, and W. J. Sparks, Standard Oil Development Co. Mr. Haynes and Mr. Christensen were nominated for secretary and treasurer, respectively.

From the areas served by the local rubber groups the following members were nominated for Division directors: *Akron*, H. F. Palmer, consultant, and R. F. Wolf, Columbia Chemicals Division, Pittsburgh Plate Glass Co.; *Boston*, J. C. Walton, Boston Woven Hose, and B. H. Capen, Tyer Rubber Co.; *Buffalo*, Chas. Miserentino, Dunlop Rubber Co., and E. C. Siverson, Buffalo Weaving & Belting Co.; *Chicago*, B. W. Hubbard, Ideal Roller & Mfg. Co., and Francis S. Frost, Jr., Frost Rubber Works, Inc.; *Connecticut*, W. J. O'Brien, Seamless Rubber Co., and Ray Dudley, Whitney Blake Co.; *Detroit*, G. P. Hollingsworth, Minnesota Mining & Mfg. Co., and G. M. Wolf, Sharples; *Los Angeles*, Ray E. Bitter, B. F. Goodrich Chemical Co., and A. F. Reznicek, W. J. Voit Co.; *New York*, M. R. Buffington, consultant, and J. J. De Munnik, American Tile & Rubber Co.; *Philadelphia*, W. F. Abbey, Firestone, and R. Kurtz, du Pont; *Rhode Island*, F. W. Burger, Kleistone Rubber Co., and E. L. Hanna, Davol

Rubber Co.; *Washington*, T. A. Werkenthin, Bureau of Ships, and N. Bekkedahl, Bureau of Standards; *Southern Ohio*, R. A. Clark and G. H. McFadden, both of Battelle Institute; *Northern California*, G. S. Ramsey and J. A. Sanford, American Rubber Mfg. Co.

The new officers and directors will be elected by letter ballot, and the successful candidates announced at the fall meeting of the Division in Cleveland. It was pointed out that a petition bearing the signatures of 25 members would also permit the nomination of any additional candidates for any of the offices.

Dr. Stavely next reported on various other activities of the Division. The fall meeting in Cleveland, October 11, 12 and 13, will be held at the Hotel Cleveland and the Division banquet is scheduled for the Hotel Carter. Amos Oakleaf, Phillips Petroleum Co., is chairman of the local committee.

More than 50 overseas scientific organizations have been contacted, and at least 15 papers have been promised for presentation at this meeting. A group of 20 from England plans to attend the meeting, possibly four or five from Holland and a similar number from France. At least one representative from Italy and one from Malaya are expected at the Cleveland meeting. The English group is composed of W. J. S. Naunton, Imperial Chemical Industries, Ltd., representing the Institution of the Rubber Industry; H. J. Stern, consultant; G. Gee, C. M. Blow, Drs. Rivlin and Koch, BRPRA; J. R. Scott and R. C. W. Moakes, BRMRA; G. Martin, Ceylon Research Institute; W. McG. Morgan, Monsanto Chemical Co., Ltd.; Fordyce Jones, Reliance Rubber; M. M. Heywood, Firestone Tire & Rubber Co., Ltd.; J. H. Carrington, Anchor Chemical Co., Ltd.; H. Cooper, Expanded Rubber Co., Ltd.; T. L. Garner, W. Freeman & Co., Ltd.; J. J. Davies, Davies Tyre House; Fred Denton, Jr., Denton & Co., Ltd.; J. A. Bidmead, K. O. Lee, and P. O. Oxborrow.

The group from Holland will include Drs. Houwink, De Decker, and Boonstra, of the Dutch Rubber Foundation; while J. leBras, of the French Rubber Institute, will head the group from France.

Dr. Stavely appealed for papers from American rubber chemists and technologists of equal quality and quantity to add to the papers from abroad to round out the Cleveland meeting program.

It was also mentioned that the Rubber Division had set aside a sum of $5,000 to help defray the expenses of these overseas guests since their funds will be limited. This sum will be replaced by subscription from members of the Division, and a committee headed by C. P. Hall, of C. P. Hall Co., will solicit funds for that purpose.

Dr. Stavely also reminded the Division members of the seventy-fifth anniversary meeting of the American Chemical Society and also the International Congress of Pure and Applied Chemistry, both of which will be held in New York in September, 1951. The Rubber Division has been requested to present papers at both of these meetings. It was stated that the Divisions' book on "Synthetic Rubbers" should be ready for distribution during 1951, and that chapters from this book might be used as papers for one of these two meetings in 1951.

The Division Banquet

The regular banquet of the Rubber Division was held the evening of April 20 at the Book-Cadillac Hotel, and owing to the efforts of G. M. Wolf and his local committee, 725 members and guests enjoyed an excellent meal and an outstanding entertainment program. Dr. Stavely presided and introduced L. Mullins of the BRPRA, and Division officers and directors and members of the local committee seated at the head table.

Table favors in the form of an attractive calendar memorandum desk pad were distributed to those at the banquet by the Witco Chemical Co., which is celebrating its thirtieth anniversary during 1950.

Chairman Stavely received a present of a gift radio from Mr. Wolf, head of the local committe.

Rubber Division, C.I.C., Meeting, Toronto, June 21

THE Rubber Division of the Chemical Institute of Canada plans a one-day meeting in Toronto, Ont., at the Royal York Hotel on June 21, as part of the meeting of the parent society June 19 through June 22. A program of eight papers has been arranged, and the officers of the Division extend a cordial invitation to rubber technologists from the United States to attend and participate in this meeting. We do not have many details of any other plans for the Rubber Division meeting, but abstracts of the papers to be presented are available.

The officers of the Rubber Division, C.I.C., are: chairman, J. Ramsey, Gutta Percha & Rubber, Ltd., Toronto; vice chairman, J. T. Black, Polymer Corp., Ltd., Sarnia, Ont.; and secretary-treasurer, N. W. Smith, Dominion Rubber Co., Ltd., Montreal, P.Q.

Abstracts of the paper to be presented on June 21 follow:

A Study of Styrene-Butadiene Copolymers. E. B. Storey and H. Leverne Williams, Polymer Corp.

It is well known that copolymers of butadiene and styrene may be prepared in which the ratio of the two components may be varied. Copolymers rich in butadiene are soft elastomers; whereas those rich in styrene are rubbery resins. Blends of these two types of materials find considerable use in mechanical goods, shoe soling, floor tiling, and other products.

As the amount of styrene in the polymer is increased, the product is vulcanizable and yields test pieces with decreasing tensile strength and elongation and increasing modulus. When the copolymer is prepared from a 30/70 butadiene/styrene charge, the test strips may no longer be flexed. When the charge ratio is 20/80, meaningful test results cannot be obtained, and the product resembles ebony. Interesting trends in various properties were noted with these polymers and blends of these with GR-S.

Blends of such polymers were prepared with GR-S, using the technique of blending in latex form prior to coagulation. The properties of such blends were at least as good as those of mill blended mixtures. Two types of studies were undertaken. The first indicated that within fairly broad limits the properties of the blends were fixed by the total styrene content rather than by the polymers mixed to achieve that end. The other series indicated that certain differences arose when the materials were blended in constant proportion without regard to total styrene content.

Postwar Review of USF Rubber. J. McGavack, United States Rubber Co., New York, N. Y.

This is a postwar review of USF rubber, a rubber designed to satisfy the demand of consumers for a superior type of material. The more important characteristics of this rubber are: extreme cleanliness, softness, light color, uniformity of composition, high resistance to flex cracking, and uniformity in cure.

This paper describes briefly the process by which such a rubber is manufactured, giving results on pilot-plant production carried out in the last two years. The text is supported by a motion picture of the process used to prepare this rubber.

The Practical Application of Research Ideas in Development of New Polymers. T. L. Davies, Polymer Corp.

New developments in the field of polymerization catalysts permit, for the first time, the production of "cold" butadiene-acrylonitrile oil-resistant polymers with improved physical properties.

A better understanding of the factors affecting the properties of rubber polymers at low temperatures indicates the possibility of designing better rubber articles for such service.

The successful application of latex or liquid preblending of the major components of a leather substitute soling compound to eliminate mixing and physical property variations opens up other possibilities in latex masterbatching.

The development of high-Mooney Butyl rubber, with its greater plasticizer tolerance, makes the production of superior age-resistant mechanical goods economically feasible.

Effect of Mechanical Aggregation on the Dispersion Characteristics of Carbon Black. E. M. Dannenberg and C. A. Stokes, Godfrey L. Cabot, Inc., Boston, Mass.

One of the most important operations in the manufacture of carbon black for the rubber industry is the densification and pelletization of the low-bulk density fluffy products produced by both the channel and furnace processes. From an initial bulk density of only three pounds a cubic foot, modern techniques of densification will produce a product of more than 20 pounds a cubic foot. Carbon black in such a highly densified and beaded form minimizes the problem of dustiness and facilitates the factory handling of large quantities in automatic conveyers.

It has been observed that the degree of mechanical aggregation required to produce this densification of carbon black has little influence on its performance in natural and most of the synthetic rubbers. This is not the case when pelletized carbon blacks are used in the preparation of inks and paints. In these applications satisfactory dispersion may be obtained with the highly aggregated forms of carbon black.

This paper discusses the influence of mechanical aggregation on the dispersion characteristics of carbon blacks. In natural rubber and GR-S high-shearing forces necessary for the disintegration and dispersion of the aggregates are developed during mixing, and in these systems the effect of moderate mechanical aggregation is small. The process of mixing other types of systems may not develop the high shearing forces to disperse properly some pelletized forms of carbon black. In relatively low-viscosity media such as water,

oils, and highly plastic polymers large differences are observed in dispersion with variations in the bulk density of carbon blacks.

Low Temperature Rubber. (Author's name not given), Firestone Tire & Rubber Co., Akron, O.

The Measurement of Strains in Tires. D. L. Loughborough, J. M. Davies, G. E. Monfore, B. F. Goodrich Co., Akron.

Because of obvious complications it is too difficult to calculate the stresses in the cords of a tire. In this work the direct measurement of strain was undertaken. Two techniques are discussed: (1) the measure of the increase in length of the cords in the outside ply, and (2) a radiographic technique in which the change in length of the cord elements, marked by steel wires, is followed by photographic methods. The measurements on a number of tires are presented.

The cords in a tire are strained about 2% by the inflation pressure. When the tire is loaded, some of the cords are thrown into compression and some into more tension. During the rotation of the tire the cords are thus subjected to a vigorous alternation of compression and tension ($\pm$ 2%). At the same time the angles between the cords change by as much as two degrees.

A few general applications are mentioned, and their importance to the tire engineer is indicated.

The Vulcanization of Neoprene. A. M. Neal, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Neoprene, unlike natural rubber or any of the other synthetic rubbers, is capable of being vulcanized without the addition of any curing agents or accelerators. For practical vulcanizates, however, metallic oxides — normally combinations of zinc oxide and magnesium oxide — are always employed as curatives, and for some applications additional accelerators have proved desirable. This paper describes the experimental work which has resulted in the development of a new accelerator for neoprene vulcanizates. This new accelerator, 2-mercapto-imidazoline, enables the compounder to produce stocks having a very rapid rate of cure while maintaining the processing safety required to insure satisfactory factory operation.

Tests are reported on vulcanizates from both Neoprene Type GN and Neoprene Type W. With both types of neoprene the stocks are characterized by superior resistance to deterioration on aging, a high state of cure, outstanding resilience, and excellent resistance to compression set. The magnitude of compression set values ordinarily increases markedly with increases in the temperature at which the compression is imposed. Data presented show that with vulcanizates of Neoprene Type W prepared using 2-mercapto-imidazoline as the accelerator the increase in set values as the imposed temperature increases from 70-120° C. is slight. Such stocks are superior to even the best "low set" natural rubber vulcanizates.

Butadiene-Styrene Resinous Copolymers. J. D. D'Ianni, L. D. Hess, and W. C. Mast, Goodyear Tire & Rubber Co., Akron.

In recent years resinous copolymers of butadiene and styrene have become of great commercial importance and have to a certain extent supplanted chemical derivatives of rubber which could not be made during the war. In addition, promising new applications have been developed which are expected to widen greatly the uses of these interesting resins.

Polymerization studies on butadiene-styrene systems containing up to 50% styrene are reported. With increasing proportion of styrene, the rate of polymerization is increased, and less modifier is required. Properties of latices stabilized with different types of emulsifiers are discussed.

The composition and physical properties of the copolymers are described in detail, with particular emphasis on the effects of varying the butadiene-styrene ratio.

The technical literature on the rubber compounding and applications of these resins is reviewed. Particular emphasis is given to their use in rubber reinforcement and impact-resistant blends, in solution applications for protective coatings and paper coatings, and in latex applications such as compounding with rubber latices and in emulsion paints.

ASTM Natural Rubber Subcommittee Detroit Meeting

A MEETING of the recently formed subcommittee 12 of Committee D-11 of the American Society for Testing Materials, of which subcommittee Norman Bekkedahl, National Bureau of Standards, is chairman, was held at Detroit, Mich., on April 19 with about 30 representatives of the consuming companies in the United States present.

L. Mullins, of the British Rubber Producers' Research Association, explained again to this group the work being done by the Association on grading and specifications for crude natural rubber, the details of which were given before the Division of Rubber Chemistry, A. C. S., at the Atlantic City meeting in September, 1949, by W. P. Fletcher and by Mr. Mullins at the Detroit meeting on April 19. Mr. Mullins mentioned that it was hoped that any improved system of grading and specifying natural rubber would be used by Indonesia and France as well as the United Kingdom. He added that he also hoped that unified proposals could be made at the meeting of the International Standards Organization, ISO Technical Committee 45—Rubber, scheduled for Cleveland in October, 1950.

E. M. McColm, plantations division, United States Rubber Co., reviewed the developments in work on new grading and technical specifications for natural rubber, which involved the visit in 1948 to the United States by Drs. Gee and Blow, of the BRPRA, to learn of the problems of American consumers, the system of bale markings and identification for plasticity and rate of cure proposed by the French producers, and efforts in Indonesia to grade natural rubber more accurately.

The considerable difficulty expected in improving the grading and identification of smallholders' rubber in Malaya was outlined and the work being carried on in Malaya by Dr. Newton of the BRPRA, and Dr. Fairfield Smith to determine the correct method for sampling lots of rubber based on a statistical analysis of existing variability were mentioned. It was indicated that it would probably be economically feasible to take 15 to 20 samples to characterize a 10-ton lot of rubber, but if a larger number of samples were required, such a procedure would be too costly.

After much discussion the subcommittee voted to continue the use of the A.C.S.-I formula using U. S. National Bureau of Standards compounding materials of standard grade for work on natural rubber specifications.

At the next meeting of the subcommittee in June of this year, data on pure gum and loaded compounds prepared according to the A.C.S.-I formula and tested by the ASTM subcommittee on standard samples will be reviewed.

The consensus of opinion of the subcommittee was that the American consumers preferred a rate of cure criterion for grading natural rubber, and it was decided to transmit this opinion to all groups working on the problem both in Europe and the Far East.

It was also decided to transmit to the natural rubber producers the idea that the American consumer wants cleaner rubber in all grades.

Minutes of the Detroit meeting of the subcommittee will be forwarded to all research stations of the natural rubber producing industry with the request that they supply the subcommittee with data on work on this subject of natural rubber specifications. The desire of the subcommittee to cooperate in the effort to improve the quality of natural rubber will be emphasized, and comments on the use of a rate of cure criterion solicited.

High Polymers at Syracuse U.

THE State College of Forestry, Syracuse University, Syracuse, N. Y., has instituted a course in rubber, plastics, and other high polymers for undergraduates and graduates, leading to M.S. and Ph.D. degrees in this type of specialization. The State College of Forestry is a unit of the University of the State of New York.

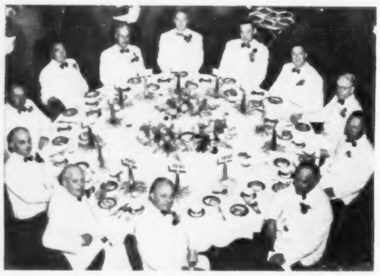
The principal responsibility for the development of the course work rests with Ralph T. Nazzaro, under the guidance and leadership of Edwin C. John, research director. Dr. Nazzaro has been associated with the rubber, plastics, and paper industries since 1936. His last position in industry was technical director of Premoid Products, Inc., West Springfield, Mass.

Buffalo Group Hears Hayden

THE Buffalo Rubber Group held a regular meeting on April 4 at the Elk's Temple, Buffalo, N. Y., with 67 members and guests attending. The meeting included an afternoon technical session, followed by a cocktail hour and dinner. The afternoon meeting featured a talk on "Synthetic Rubber Looks into the Future," by Oliver M. Hayden, E. I. du Pont de Nemours & Co., Inc., substituting for E. R. Bridgwater who was unable to attend owing to illness. The talk was similar to that given by Mr. Bridgwater before the March 24 meeting of the Chicago Rubber Group, reported on page 194.

Dinner speaker was Harry Maynard, Federal Bureau of Investigation, who gave an interesting talk on "Activities of the F.B.I." The meeting concluded with a drawing for a door prize won by Mr. Meyers, J. O. Meyers & Co.

Los Angeles Group Hears Boswell and Morris



Past TLARGI Chairmen at the March 7 Meeting: *(Clockwise)* 1941, L. L. Horchitz, B. F. Goodrich Co.; 1942, G. K. Norton, Kirkhill Rubber Co.; 1943, C. J. Roese, Retired; 1944, A. L. Pickard, Braun Corp.; 1946, C. M. Reinke, Reinke & Amende; 1947, C. R. Wolter, Witco Chemical Co.; 1948, P. W. Drew, Goodyear Tire & Rubber Co.; 1949, C. H. Churchill, Sterling Rubber Products Co.; 1928, R. B. Stringfield, Fullerton Mfg. Co.; 1929, A. F. Pond, United States Rubber Co.; 1937, T. K. Hill, Kirkhill Rubber Co.; and 1938, E. L. Royal, H. M. Royal, Inc.

THE Los Angeles Rubber Group, Inc., held a regular meeting on March 7 at the Mayfair Hotel, Los Angeles, Calif. Approximately 60 members and guests attended the afternoon technical session which featured a talk on "Why Gamble with Quality" by Carl M. Boswell, C. M. Boswell & Associates.

Mr. Boswell stated that the science of statistics is assuming an increasingly important role in the quality control problems of industry. Variation is inevitable in the products and processes of industry, and one of the major functions of statistics is to measure these variations to determine their significance. By providing a precise measure of variability, certain definite predictions can be made with a minimum of risk concerning the behavior of the quality characteristics of a product and/or the process that produced it. Statistical quality control, therefore, provides an accurately calculated risk instead of predictions based on guessing or rules of thumb.

The evening dinner-meeting, attended by some 200 members and guests of the Group, was sponsored by the past chairmen, of whom 12 were present, as shown in the accompanying photograph. Past chairmen Raymond B. Stringfield, Fullerton Mfg. Co., and Edward L. Royal, H. M. Royal, Inc., gave a history of the Group from its inception in 1927, with a membership of 43, to its present status as a corporation with more than 350 members. Charles J. Roese, now retired, also spoke on some of the accomplishments and activities of the Group, including its placement bureau and educational program.

After-dinner speaker was W. C. Mullendore, Southern California Edison Co., who discussed "How Much Is Left of the Free Enterprise System?" Mr. Mullendore said that the next few years will be critical in determining whether we will escape the socialist state. The meeting closed with a drawing for door prizes donated by the past chairmen and won by John McSparran, C. P. Hall Co.; Arch Meese, Ray Niemans, and Herman Jordan, all of E. I. du Pont de Nemours & Co., Inc.; C. H. Jones, Molded Products Co.; Gaelen Norton, Kirkhill Rubber Co.; George Foos, C. K. Williams Co.; D. C. Maddy, Harwick Standard Chemical Co.; and Chuck Peters, Master Processing Corp.

Approximately 260 members and guests of the Group, attended a meeting on April 4, also at the Hotel Mayfair. Feature of the afternoon technical session was a talk on "The Behavior of Rubber Gaskets at Low Temperatures" by Ross E. Morris, Mare Island Naval Rubber Laboratory.

Mr. Morris noted that a gasket made from either natural or synthetic rubber may fail at low temperatures because of one or more of the following changes in the rubber: increase in internal viscosity; crystallization; or second-order transition. An increase in viscosity of the rubber does not affect the recovery stress of the gasket, and consequently its ability to seal fluid pressure, unless the bearing surfaces holding the gasket move too far apart when fluid pressure is applied. Should there be excess movement of the bearing surfaces, a gasket with high internal viscosity will not recover fast enough to maintain adequate sealing pressure.

Crystallization of the rubber in the compressed gasket causes the recovery stress to relax and may result in complete loss of sealing ability, Mr. Morris explained. The effect of crystallization is worsened by the recurrent shrinkage in volume of the gasket as it is compressed between the bearing surfaces. If a compressed gasket is cooled below the second-order transition temperature of the rubber, complete stress relaxation occurs, and the gasket leaks. Ordinary GR-S containing a good low-temperature plasticizer is one of the best rubbers to use in gaskets for low-temperature service, since this rubber does not crystallize, and the plasticized rubber has low internal viscosity. The cold compression set test is an excellent method for evaluating vulcanizates for gasket service at low temperatures, the speaker concluded.

The meeting was sponsored by Goodyear Tire & Rubber Co., and 65 members of the Goodyear organization were present at the dinner-meeting. Speaker at the evening session was Brig. Genl. Thomas H. Chapman, who discussed "Air Force Procurement on the West Coast." General Chapman described the methods used by the procurement office and the problems encountered in its work. The speaker further declared that the rubber industry has measured up to the difficult task of supplying the right products to the Air Force despite rapid changes in requirements.

The meeting concluded with a drawing for seven door prizes donated by Goodyear and won by: A. R. Hromatka, Group photographer (who took the accompanying photographs); Bill Michalek, Plastic & Rubber Products Co.; Zilie Palumbo, Ohio Rubber Co.; W. E. Alexander, Industrial Rubber Cement Co.; H. D. Low, W. J. Voit Rubber Corp.; Howard Fisher, Goodyear; and Fred Weber, Products Research Co.

The Los Angeles Group will hold its annual summer outing on June 17 and 18 at the Del Mar Hotel, Del Mar. The outing has been planned to precede the Shrine Convention being held in Los Angeles the following week, and all "Rubber Shriners" are invited to attend. The outing will include a full program of athletic and social activities, and is under the general chairmanship of R. D. Abbott, consultant.

Goodyear Representation at April 4 Meeting of The Los Angeles Rubber Group, Inc.

Future of Synthetic Rubber

A TALK on "Synthetic Rubber Looks into the Future," by E. R. Bridgwater, E. I. du Pont de Nemours & Co., Inc., featured the dinner-meeting of the Chicago Rubber Group on March 24. Approximately 120 members and guests attended the meeting, at the Morrison Hotel, Chicago, Ill. In the afternoon session preceding the dinner, a talk on "This is Our Problem" was given by Wayne Griffin, personnel supervisor for the Electro-Motive Division, General Motors Corp.

Mr. Bridgwater reviewed the historical record of consumption of the various synthetic rubbers since 1941 and pointed out that all have declined sharply from their wartime peaks. GR-S supplied 59% of our total elastomer consumption in its peak year, 1944, but only 29.2% in 1949. Butyl reached its peak consumption in 1946, when it supplied 6.7% of our total elastomer consumption, and declined to 4.8% in 1949 although retaining a larger portion of its wartime market than any other synthetic. Neoprene supplied 5.5% of total elastomer consumption in its peak year, 1944, but only 2.9% in 1949. Nitrile rubbers furnished 2% of the total consumption in 1943, but only 0.6% last year.

In endeavoring to forecast future trends, the speaker considered separately synthetic rubber for tires, inner tubes, and other products. In the tire industry the future is not bright for synthetics. Although low-temperature GR-S is excellent for passenger-car tire treads, it is not the equal of natural rubber for auto tire carcass stocks. More serious yet is the fact that we have no synthetic rubber from which a satisfactory truck tire can be made. During World War II we had a substantial continuing supply of natural rubber from Ceylon and Liberia, but these sources might be closed in a future emergency.

Mr. Bridgwater said that there is every reason to believe that a satisfactory synthetic rubber for truck tires can be developed if the problem is attacked on all possible fronts, although it seems unlikely that any modification of GR-S will solve the problem. It would seem desirable to encourage private competitive research on synthetic rubber for tires, but unfortunately the current Rubber Act has an opposite

effect. It is probable that under present-day conditions tire manufacturers would use GR-S even though competition between GR-S and other synthetics was permitted. However, if a tire manufacturer should find that some other synthetic rubber would give better tires, there is no assurance that he would be permitted to use it. So long as the law provides for an actual or potential restraint on competition between the various synthetic rubbers for tires, it serves to discourage research and development in that field.

With respect to inner tubes, the picture is much brighter, Mr. Bridgwater said, since it is now generally agreed that Butyl is an excellent tube rubber. During recent months the R-1 restrictions have been removed, and Butyl is being given the test of free competition, the ultimate test of value. It is meeting this test with flying colors.

In non-transportation products the future of synthetic rubber looks extremely bright, the speaker declared. All of the synthetics have been in free competition with themselves and natural rubber since September, 1947. In 1949, natural rubber was used to only 50.4% of the total consumption in this field, while GR-S contributed 24.9%, reclaimed rubber 14.4%, neoprene 7.9%, nitrile rubbers 1.8%, and Butyl 0.5%. Indications are that in 1950 the synthetics will supply a still larger percentage of non-transportation elastomer requirements. With hundreds of currently or potentially available polymerizable monomers from which special-purposes synthetics can be made, the possibilities for the production of tailor-made polymers to meet specific end-use requirements are literally endless. American rubber manufacturers, operating in a highly competitive market, have been quick to take advantage of any improved rubber, and in such an environment technical progress is bound to be made. In the future, Mr. Bridgwater stated, it is almost certain that natural rubber's percentage of the non-transportation elastomer market will continue to decline, and may drop to less than 25% within 10 years.

In the business session preceding the talk, it was announced that the Group will hold its annual golf outing on July 28, with Bill Fairclough, Enjay Co., in charge of the arrangements committee for the affair.

Summer Laboratory Courses

THE Polytechnic Institute of Brooklyn is arranging a series of laboratory courses during June and July. Each course lasts one week and provides for detailed demonstrations and experiments in its topic. Attendance will be limited to about 12 persons in order to permit every participant to work personally with all available equipment and to be thoroughly familiarized with the measurements and their evaluation.

The program for the course is as follows: June 12-23, Industrial Applications of X-Ray Diffraction; June 26-30, Advanced X-Ray Diffraction; June 26-30, Methods in Physical Biochemistry; July 17-21, Weight and Shape of Polymers in Solution; and July 31-August 4, Techniques of Polymerization and Copolymerization.

A detailed program and further information may be obtained from either Professor I. Fankuchen or Professor H. Mark, Polytechnic Institute of Brooklyn, 99 Livingston St., Brooklyn 2, N. Y.

Evaluating Synthetic Rubber

A TALK on "Some Techniques for Evaluating Synthetic Rubber," by Theodore A. Werkenthin, Bureau of Ships, Navy Department, featured the March 28 meeting of the Washington Rubber Group, held at the Cosmos Club, Washington, D. C., with some 45 members and guests attending.

Mr. Werkenthin pointed out that, in general, the development of testing techniques for rubber products has been neglected. Before the advent of highly specialized compounding ingredients it was possible to control the quality of a rubber product by specifying its composition. Use of the wide range of compounding ingredients now available has made it necessary to supplement the generally accepted routine physical tests with highly specialized evaluation techniques involving simulated service tests.

By use of these specialized tests the Bureau of Ships was able to make the transition from natural rubber to various types of synthetic rubber without sacrificing the quality of rubber products. The speaker then briefly described the 99 special tests developed by the Bureau and their use in evaluating the specialized rubber products used by the Navy. The importance of standardization and simplification of low-temperature testing methods was discussed, and the cooperative efforts of the Army Quartermaster Corps, ASTM low-temperature sub-committee, and the Bureau of Ships were described as examples of general cooperative work between industry and the government.

In the business session preceding the talk, Group President R. J. Devereaux, B. F. Goodrich Co., announced that Mr. Werkenthin has been appointed the Group's representative on the board of directors of the Division of Rubber Chemistry, A. C. S. Social Director James Scanlan, Gates Rubber Co., discussed plans for a June outing, and Membership Director Richard Harmon, Connecticut Hard Rubber Co., announced that the Group's total paid-up membership is now 159.

Le Beau Addresses Washington Group

A talk on "Thermal Depolymerization of Vulcanized Elastomers," by Desiree S. le Beau, director of research, Midwest Rubber Reclaiming Co., highlighted the April 25 meeting of the Washington Rubber Group. Approximately 90 members and guests attended the meeting in the Cosmos Club.

Dr. le Beau stated that the reactions which occur in vulcanized polymers during their manufacture and use in rubber goods can be expected to exert a conditioning effect on the reclaiming of the scrap obtained from such goods. A short survey of the digester process for reclaiming was given by means of a flow sheet, and the influence of reclaiming conditions were discussed. The effects of high temperature, swelling, acidity or alkalinity of the surrounding medium, and reclaiming agents on the depolymerization reaction were described in detail, and the differences in this reaction because of the structure of the natural or synthetic polymer were illustrated by means of slides. The properties of the finished reclaim, including flow, shrinkage, stability, and modulus, were discussed on the basis of the physical and chemical structure of the reclaim. As a result of wartime developments, the reclaim industry is now producing a better-quality product than before the war and aims at uniform product quality by not segregating tires by size or type of polymer. This practice of non-segregation to attain uniformity was characterized by Dr. le Beau with the phrase, "From the greatest disorder we have the greatest order."

In the business meeting preceding the talk, President R. J. Devereaux, B. F. Goodrich Co., introduced J. D. Hastings, chief chemist of Socfin Co., Ltd., who spoke briefly on recent improvements in packaging natural rubber. Group Vice President and Director T. A. Werkenthin, Navy Department Bureau of Ships, announced that the A. C. S. Rubber Division had agreed to hold its spring 1951 meeting in Washington, with the local group acting as hosts.

The following slate of officer candidates was named by the nominating committee and from the floor and will be voted on in a letter ballot early in May: president, L. G. Polhamus, Department of Agriculture, E. W. Glen, Department of Commerce, and W. G. Stubblebine, Army Quartermaster Corps; vice president, H. E. Wirth, Firestone Tire & Rubber Co., and T. R. Scanlon, Gates Rubber Co.; treasurer, E. G. Holt, Department of Commerce, and R. W. Hackett, Office of Rubber Reserve; secretary, J. T. Cox, Jr., McBride, McBride & Cox, H. C. Bugbee, Natural Rubber Bureau, and Richard Harmon, Connecticut Hard Rubber Co.; and recording secretary, Rachel J. Fanning, National Bureau of Standards, Ethel Levene, Navy Department, and A. J. Kraft, India RUBBER WORLD.

Synthetic Fibers Discussed

THE Boston Rubber Group held its spring meeting on March 17 at the Hotel Somerset, Boston, Mass. Approximately 334 members and guests attended the meeting, which included a cocktail hour, dinner, and two talks by men from E. I. du Pont de Nemours & Co., Inc., as follows: "The Use of Synthetic Fibers by the Rubber Industry," W. Wycliffe Owen; and "Factors Influencing the Formation of Blisters in Rubber Products during Wet Service," Charles E. McCormack.

Dr. Owen stated that although the secret of making fiber-forming materials is known, it is highly questionable that any single synthetic will ever be a universal fiber. The reason for this doubt is that any given product requires consideration of many characteristics, including stress-strain behavior, density and its effect on fiber gage, moisture absorption, inter-fiber friction, dimensional stability, heat stability, plasticity, and behavior toward the many substances with which it may come in contact.

Out of the fairly large group of synthetic yarns currently being produced in commercial quantities only three fibers, high-tenacity viscose rayon, nylon, and saponified acetate rayon, have enough desirable characteristics to make them attractive as reinforcing agents for rubber articles. Other fibers have glaring deficiencies, such as low strength, excessive elongation, thermoplasticity, etc., the speaker said.

While viscose rayon offers high strength per unit weight, high fatigue resistance, and low cost per unit of utilizable strength, it loses strength and increases in elongation as its moisture content increases. Nylon's extra-high strength, very high fatigue resistance, and low sensitivity to moisture are especially attractive, but its

(Continued on page 208)

RUBBER WORLD NEWS of the MONTH

Action on Rubber Legislation Delayed; NSRB to Study Carbon Black as a "Strategic" Material

Action on the Vinson bill in the House is not expected until mid-May because of the many other bills before the House of Representatives. Senate consideration of rubber legislation is expected immediately thereafter, but hopes for acceptance of the industry-supported Bricker bill are not great.

Carbon black producers have petitioned the National Security Resources Board to have their product reclassified as a "strategic" material by the Munitions Board and for the stockpiling of carbon black either as such or as GR-S black masterbatch, because of the very probable shortage in event of a war emergency. The NSRB was expected to appoint Harry Titus, of the Carbon Black Export Association, to make a study of the problem, after which this agency might recommend stockpiling, make a negative recommendation, or none at all.

An excise tax cut on automotive tires and inner tubes appeared unlikely at the end of April. A reduction in excises on tires for lawnmowers, baby carriages, tricycles, and perhaps some bicycles was voted in the House.

A high production rate continued in almost all branches of the rubber industry except footwear, where layoffs of workers began in April. Mounting natural rubber prices resulted in an increase of 5% for first-line truck tires and an increase in the production and consumption of GR-S.

United States Rubber Co. and the United Rubber Workers of America announced that they had agreed upon a pension and insurance contract and certain amendments to their collective bargaining agreement. Several work stoppages plagued the industry in the Ohio area.

Rubber Legislation Activity

The Easter recess and subsequent debate on fiscal 1951 appropriations in the House delayed further consideration during April by Congress of new rubber policy legislation to succeed the Rubber Act of 1948 when it expires June 30.

Chairman Carl Vinson of the House Armed Services Committee twice informed interested parties that he would appear before the House Rules Committee on the next day for clearance of the three-year extension of the Rubber Act of 1948 for floor consideration. Each time, however, the announcements were premature. The House Rules Committee expected to hear Vinson's appeal for a rule clearing his rubber bill for floor debate and vote at the earliest on April 28, or more likely, during the week of May 1. There is no assurance that the House will take up the rubber bill as soon as appropriations are out of the way, but the general expectation is that the rubber bill will reach a vote in the House by mid-May.

Vinson, when he does appear before the Rules Committee, will ask for a two-hour rule—giving proponents and opponents each an hour to debate the measure before voting. Objections are expected to be raised on the floor by administration spokesman and some Republicans, but a serious battle to defeat the bill is not expected.

Senator Lyndon Johnson (D., Tex.), who heads a Senate Armed Services rubber subcommittee, has repeatedly declared his intention of waiting for House approval of the Vinson bill before commencing hearings, but he does not want to wait beyond mid-May.

Johnson has refused to commit himself to either the Vinson extension or the Bricker bill introduced in late March. He has promised hearings to both industry and government officials and several times proclaimed an "open mind" on rubber matters, including the Bricker bill's recommendation for a synthetic rubber stockpile. Most observers feel fairly certain that Johnson will accept a simple extension of P. L. 469, as proposed by Vinson; only somewhat less likely, according to speculation, is that he will write his own bill as a compromise between the Vinson extension and the Bricker bill. Complete acceptance of the Bricker bill has been virtually ruled out as a possibility.

The Rubber Manufacturers Association's National Security Committee, before some of its members left the country for the Rubber Study Group meeting in Brussels, met in Washington to review the Bricker bill. Virtually unanimous support for the measure, a combination of three "plans" advanced by the RMA committee to Vinson earlier, was reported. The lone dissenting voice was that of one of the "Big Four" who has repeatedly objected to leasing government rubber plants as long as Congress insists that specification controls for synthetic rubber are necessary to assure adequate consumption. That position was taken by Goodyear Tire & Rubber Co. in House hearings.

The principal administration agencies concerned with rubber legislation have been hard at work since the House hearings preparing their presentation for Senator Johnson's hearings. They are not happy with an extension of the present law and feel cheered by Johnson's proclamation of an "open mind," something they did not encounter in the House.

The administration hopes Johnson will draft a bill clearing the way for plant disposal subject to security and anti-trust restrictions. The Bricker bill's security restrictions are too weak, they claim, and its anti-trust restrictions non-existent. The administration will seek also more favorable financial terms than the Bricker bill's "depreciated" value.

Bricker has defended his bill as a measure recognizing the "valid assumptions" that technological progress will be made more rapidly under a law permitting the industry to operate in "liberty"; the industry is now ready to make "vast strides" in development and exploitation of new knowledge; and the industry will use at least the 200,000-ton annual security minimum of GR-S with or without active or standby government control authority.

Also, the administration would like to see more flexibility in the new law for the use of specification controls than provided by the current law or the Bricker bill. The Commerce Department is reported entirely opposed to Bricker's proposal for a hard-and-fast systematic roll-back of the controlled "mandatory" use area—50% at six-month intervals.

As a concession to this opposition, the RMA committee has drafted an amendment to the Bricker bill, authorizing the department to increase specification controls should the industry fail to consume GR-S at the minimum security rate within the previous quarter. The Bricker bill provides a six-month wait.

There was still some confusion in late April as to whether Chairman Millard Tydings of the Armed Services Committee promised the Banking and Currency Committee an opportunity to conduct separate follow-up hearings on portions of the Bricker bill dealing with plant disposal. The bill directs lease of all rubber plants; the leases expire coterminous with the act.

Senator Bricker has said he very clearly understood that Banking, of which he is a member, will have this opportunity. The Armed Services Committee staff and Senator Johnson are equally firm in stating that Banking's role will be confined only to the privilege of having an observer sit at the committee table when Johnson conducts his hearing. Banking will also be informally consulted on disposal policy, he said, but all decisions will rest with the Armed Services Committee.

NSRB to Study Carbon Black

Carbon black producers have petitioned the NSRB to have the Munitions Board change the classification of carbon black from that of a "critical" to a "strategic" material and to purchase and stockpile carbon black either as such or as GR-S black masterbatch.

Details of the petition to the NSRB on February 8 recently became available. It was stated that carbon black is just as necessary in time of war as rubber since many rubber products cannot be made of either natural or synthetic rubber without carbon black.

Carbon black producers contend that it will be difficult, if not impossible, to secure a sufficient supply of either channel or furnace black for use with rubber in an emergency for the following reasons:

A substantial capacity for producing furnace and channel blacks is now shut down owing to diversion of natural gas to pipelines on long-term contracts (minimum 20-year contracts required by Federal Power Commission as condition of approving pipeline operation); other plants have been shut down for a variety of reasons. Shut-down plants are permanently lost because of corrosion of equipment while out of production.

Production estimates for channel black are 579,700,000 pounds for 1950, compared with 627,369,000 in 1949, 676,397,000 in 1948, and 654,128,000 in 1947.

To increase production of furnace black in time of war would require diversion to furnace black production facilities of the natural gas or the special-type gas oil used in such production. This move would bring about shortages of gas for pipelines

serving essential industries elsewhere in the nation. Moreover the special gas oil used for furnace black production is also essential for diesel engine operation, and in time of war the demand for diesel oil would increase, thus not permitting its diversion to carbon black production.

New pipelines to the West Coast, also essential in time of war, will soon be tapping natural gas reserves located near wartime government channel black plants in the West Texas-New Mexico area; so these plants, two of which have been leased to private operators, cannot be counted upon to produce fully in time of war.

At the outset of a war emergency the demand for rubber and carbon black is immediately large because of the need of tires to equip both old and new military vehicles. Sufficient quantities of rubber and the proper types of carbon black must be on hand.

Based on the carbon black producers' petition, the NSRB has decided to make a thorough investigation of carbon black production facilities and raw materials, and the appointment of Harry Titus, of the Carbon Black Export Association of New York, to head up the investigating committee was expected momentarily at the end of April. The study, which will probably take several months, will be made to determine whether economic conditions are such that carbon black producers will not produce adequately in the event of an emergency. On the basis of the study the NSRB might recommend to the Munitions Board that it stockpile carbon black, or make a negative recommendation or none at all.

Brussels Study Group Meeting

The United States Department of State on April 19 released the names of the delegate, secretary, and government and industry advisers to the Seventh Session of the Rubber Study Group, which convened at Brussels, Belgium, on May 2. The Rubber Study Group was organized in 1944 by the governments of the Netherlands, the United Kingdom, and the United States to serve as an advisory body on matters of common concern. The Group makes studies of the world rubber position, considers measures designed to expand world consumption of rubber, considers how best to deal with special problems as they arise, and submits reports and recommendations on the subject to the participating governments. Its membership now includes 13 additional governments and the British Colonies.

The official State Department delegate is W. C. Armstrong, and George H. Alexander, also from that department, will act as secretary.

Government advisers are: P. D. Allen and J. A. Todd, from the Brussels and London embassies, respectively; F. D. Bates, Jr., Munitions Board; G. B. Hadlock, Office of Rubber Reserve, RFC; and, E. G. Holt, Rubber Division, Commerce Department.

Industry advisers consist of H. S. Firestone, Jr., Firestone Tire & Rubber Co.; J. W. Keener, B. F. Goodrich Co.; P. W. Litchfield, Goodyear; W. F. O'Neil, General Tire & Rubber Co.; T. Robins, Jr., Hewitt-Robins Corp.; G. W. Tisdale, U. S. Rubber; G. K. Trimble, Midwest Rubber Reclaiming Co.; A. L. Viles and W. J. Sears, RMA; and R. D. Young, Rubber Trade Association.

At the Brussels meeting, the Study Group, as usual, reviewed the production, consumption, and trade aspects of the world rubber situation and reexamined the statistical position regarding production and consumption of rubber throughout the world.

The American delegation presented a paper calling attention to the large market in the United States for *Hevea* latex in foamed rubber products and said that development of that market depends upon larger supplies of latex from the Far East and at prices low enough to permit competition between mattresses and furniture made with foamed rubber instead of cheaper materials. It was emphasized that a mass market for foamed rubber products could be developed in this country, but the short supply and high price of latex were preventing this development. The recent increase in the use of latex in the United States, the United Kingdom, and Europe was also mentioned.

The RMA also presented detailed forecasts of the rubber supply and demand outlook for the next three years and estimated that the crude natural rubber production expansion in that period will not be so great as expected, leading to an increased consumption of synthetics, including GR-S.

Action on Excise Taxes

The House Ways and Means Committee voted "tentative" approval April 20 to removing manufacturers' excise taxes from tires on lawnmowers, baby carriages, tricycles, and perhaps some bicycles.

At the same time it voted to retain the 9¢ a pound tax on inner tubes and the 5¢ a pound tax on automotive tires, which bring, together, about $150,000,000 a year into the federal treasury.

Rejection of the tire manufacturing and distribution industry's appeal for reduction in tire and tube excises to half the current rates was generally expected by the trade and Congressional proponents.

Even the "tentative" nature of the committee's tax cut proposals leaves little hope for later inclusion of automobile, truck, bus, and tractor tires and tubes. Any reconsideration is more likely to restore items now scheduled for reduction than add new ones to the list earmarked for cutting or elimination.

Removal of excises on baby carriage, lawnmower, tricycle, and probably some bicycle tires, on the other hand, is in line with the general approach the committee took in its two-day voting on these taxes. It carefully chose items for cutting which are used by small children and babies. This approach was also true in its selective reductions for toilet preparations and sporting goods in the retail tax group.

Separate legislation was introduced in the House by Rep. Walter Huber (D., Ohio), early in February to reduce the tire and tube manufacturers' excises by rolling them back to 1941 levels. Barring a sudden reversal of committee sentiment, this bill probably will never get to the floor.

ITO Charter Hearings

In connection with the House hearings on the proposed Charter for the International Trade Organization, the State Department, in April, proposed to Congress the abandonment of the "American selling price" as a basis for determining tariff protection for the United States rubber footwear industry, but said that it would not mean a lessening of that protection.

Assistant Secretary Willard Thorp, the Departments economic policy chief, told the House Foreign Affairs Committee that the State Department plans to compensate for the proposed step by raising the duties on imported footwear, so they will be "identical" with present levels.

The *ad valorem* (or percentage of selling value) duties for imported rubber footwear are assessed on the basis of the wholesale price of the same article of American manufacture. Except for a handful of product groups, the United States accepts the wholesale value of the article in the country of origin as the base on which import levies are determined.

This proposal for abolishing "American selling price" for rubber footwear as a basis for import levies is a result of complaints by other nations regarding hindrance to their efforts to sell more goods to this country and was one part of a comprehensive bill submitted to Congress for simplifying our customs procedures.

Workers in the rubber footwear industry oppose the abolition of "American selling price" because they fear a flood of imports produced by cheap labor in Japanese and Czechoslovakian factories. Thorp's assurance that a compensating increase in *ad valorem* duties, to offset protection lost by using the lower foreign wholesale price in determining payable duties, took cognizance of these complaints.

The State Department official appealed for United States ratification of the ITO Charter as a necessary step to get the world back to multilateral trading. He warned that failure to ratify would doom the Charter and force this country into bilateral trading pacts in order to hold our markets. Ratification by 20 nations is required to put the Charter into effect, and almost all of the 54 nations which helped draw up the charter two years ago are waiting for this country to act first, he said.

Thorp told the House Committee, in regard to the use of the "American selling price," that its abolition is necessary to conform with the ITO Charter and filed a detailed statement on the matter with the committee.

The RMA, as mentioned in our April issue, in letters to each Congressman, said a majority of its members opposes the Charter in its present form, although agreeing with its broad purpose of expanding world trade.

In a letter to Chairman John Kee of the House Foreign Affairs Committee, dated April 26, the RMA also registered with Congress its vigorous opposition to the proposed Havana Charter. It expressed fear that Charter provisions for Intergovernmental Commodity Agreements could only lead to a super world cartel no less vicious than those which existed before American-made synthetic rubber came into wide use.

The industry also challenged the Foreign Investment provision of the Charter and numerous other sections as obscure, impractical, and impossible of interpretation.

In discussing the Charter, A. L. Viles, president of the RMA, in the letter to Representative Kee said:

"We are able to discern little if any resemblance between the original concept of the ITO and the Havana Charter. It is not our intent to reflect in any way upon the motives of the so-called architects of the Charter. We are sure they are beyond challenge. But we can only conclude that their lack of experience and realism and perhaps their zeal to bring forth an agreement at any cost after four arduous conferences can account for the impossibly confused and completely unworkable document that lies before you. Be that as it may, it is clearly evident that four rounds

of international horse trading at London, New York, Geneva and Havana have so debauched the original principles that this once lofty concept is now stained beyond recognition."

Exports and Export Controls

The Department of Commerce on April 6 removed export controls from several rubber products and increased the dollar limits at which some others may be exported without a validated license.

Now permitted to be exported to any destination without government license are the following products: flat transmission belts and belting and other transmission belts and belting, except V-belts; all other rubber and balata belts and belting, except conveyer and elevator belts and belting; rubber rings and field gun recoil mechanisms.

The action was announced in "Current Export Bulletin 569" of the Office of International Trade, along with these changes in the dollar value limits at which products can be exported license free: Vistanex, lowered from $250 to $100; pneumatic tires and casings except of combat and run-flat construction, raised from $100 to $250; off-the-road tires, except farm tractor and implement, raised from $100 to $250; and, rubber-covered lamp cord, raised from $100 to $300. Shipments of these products in larger quantities must be validated by license to anywhere except the Americas.

The Commerce Department announced on April 13 that United States exports of rubber products and synthetic rubber were valued at $13,592,350 during the first two months, of 1950, a decrease of 38.5% compared with $22,095,200 during the corresponding period of 1949.

Synthetic rubber accounted for $953,116 of the total value of shipments for the two months of 1950, an increase of 35% as compared with $707,986 for the corresponding period of 1949. Exports of every other major category of rubber products declined.

Tire Production and Prices Higher

A high rate of automobile production and increased tire buying by tire dealers and retail customers faced by possible further tire price increases have caused some tire manufacturing companies to lengthen their work week. Goodrich operated three tire plants for seven days during the week ending April 2; Seiberling Rubber Co. increased from 5½ to 6 days; and U. S. Rubber and Firestone were reported as operating at full capacity.

At the same time Goodyear, U. S. Rubber, and Dayton Rubber Co. followed the lead of Goodrich and raised first-line truck tire prices 5%, effective April 1. There was some indication that the price of passenger-car tires might also be advanced, owing mostly to the rapidly rising price of natural rubber. This move might be avoided, however, if the tire manufacturers can change their compounds to include more synthetic rubber, which is still selling at 18½¢ a pound.

GR-S production schedules have been raised from 20,000 tons in February to 24,250 tons in April, 27,500 tons in May, and 30,000 tons in June.

Manufacturers' shipments of passenger-car tires in February were up 5.5% to 5,260,629 units from 4,987,302 in January, according to the monthly report of the RMA issued on April 4.

Production of passenger tires was down slightly to 5,605,890 units from 5,710,675 the month before. Manufacturers' stocks were up 3.1% to 9,784,715 units, as compared with 9,488,993 units on January 31.

Shipments of truck and bus tires rose 3.2% to 955,648 units from 925,693 in January. Production of truck and bus tires was 2.9% lower in February than in January, with 1,084,713 units produced against 1,116,701 in the previous month. Stocks of truck and bus tires increased 7.2% to 2,011,912 units.

Shipments of automotive tubes gained 5.6% to 5,609,901 units from 5,312,028 in January. Production of inner tubes increased 3.1% to 5,803,209 units, and end-of-month stocks were up 1.2% to 11,058,688 inner tubes.

Non-Transport Goods, Except Footwear, Booming

Business in most non-transport products was at a high production level during the first part of 1950. The footwear branch of the industry, however, has been in a slump for the same period owing to the mild winter in many parts of the country, and the cost-price situation has recently been aggravated by the mounting price of natural rubber. Demand for footwear is decidedly off, and the higher rubber price cannot be made up by raising the price of the product on an already saturated market.

A layoff of workers in the canvas footwear department of U. S. Rubber at Naugatuck, Conn., started in mid-April, and in about 30 days some 400 employes, or about 10% of the workers in that department, will be out of their jobs. These workers are usually absorbed in the companys' waterproof footwear department, but production is also lower than normal there and cannot take on these additional employes. The company hopes to be able to give jobs to these 400 workers this summer in the canvas footwear department or in some other part of the business, but plans are indefinite, according to a spokesman for U. S. Rubber.

Production cutbacks in the footwear departments of other companies in the New England area have also been reported.

The Commerce Department reported on April 19 that United States consumption of new rubber in the manufacture of non-transport goods was up 15% in the first two months of 1950, compared with the same period a year ago.

Manufacturers of non-transport goods used 30,783 long tons of new rubber in February, and 63,003 tons in the first two months of the year, as against 54,567 tons in the first two months of 1949. In transportation goods, manufacturers used 57,657 tons in February, 119,395 tons in January-February 1950, as compared with 113,574 tons in January-February 1949, an increase of 5%.

The non-transport segment of the industry accounted for 34.8% of total new rubber consumption in February, compared with 34.3% in January and 33.3% in the calendar year 1949. Use of natural latex also increased in this segment of the industry, with 3,844 tons used in February, another new record. Percentage use of reclaimed rubber rose appreciably in the non-transport field to 34.1% of total new rubber in February, against 31.8% in January.

Estimated consumption of new rubber by the entire industry for March increased to 99,028 long tons from 88,329 tons in February, a gain of 12.1%, according to the monthly report of the RMA released on April 24.

Use of natural rubber in March was 61,008 long tons, an increase of 7.7% from February, when 56,630 long tons were used.

Consumption of synthetic rubbers increased 19.9% to 38,020 long tons from 31,699 tons the month before. Of this total 28,788 tons were GR-S; 3,462 tons, neoprene; 4,765 tons, Butyl; and 1,005 tons, nitrile type rubbers.

Reclaimed rubber use was estimated at 22,222 long tons, 12.1% higher than the February tonnage of 19,824 tons.

Labor Agreements Made

U. S. Rubber Co. and the United Rubber Workers, CIO, announced on April 5 that they had agreed upon a pension and insurance contract and certain amendments to their collective bargaining agreement. By establishing higher minimum pensions, the agreement amends a plan which the company has had in effect since 1917, it was said.

Pensions after 20 years of service at age 65 are provided in an amount equal to 1% of the employe's average monthly earnings during the ten consecutive years in which he received his highest monthly compensation from the company, multiplied by the number of years of service credited to the employe. The company takes credit for only one-half of Social Security benefits.

The agreement also provides for minimum pensions of $100 a month including Social Security for employes at age 65 who have 25 or more years of service. This minimum pension is scaled down at the rate of four dollars a year to provide for a minimum pension of $80 at 20 years of service. Employes may retire after 20 years of service at age 55 at the company's option on an actuarially reduced pension.

A disability pension after 20 years of service is provided for employes who become totally disabled, with a minimum guarantee of $60 a month.

The agreement provides that life insurance in the sum of $2,000 will be purchased by the company for all employes and permits employes to carry an additional $1,000 on a contributory basis.

The new collective bargaining agreement runs until July 1, 1951, and contains a wage reopening clause permitting the question of wages to be negotiated upon 60-day notice after July 1, 1950.

The agreement provides for double-time for work performed on Christmas and New Year's Eve, and the right to negotiate intra-plant wage inequities on a local basis.

The pension agreement is subject to the approval of the stockholders of the company. The pension and insurance agreement and the amended labor agreement are subject to approval of the executive board of the international union and will become effective when local union supplementary agreements at the various plants are completed, or on July 1, 1950, whichever is later.

The pension and insurance agreement is for a period of five years subject to the right of the company to terminate it after two years.

Approximately 33,000 employes in 19 plants were represented by the union in the negotiations which began on February 21, 1950.

Meanwhile, local URWA unions at the Goodrich and the Firestone plants in Akron voted to petition the international union to formulate a 1950 wage program. A minority group in the union has pointed out that many of the local unions are find-

ing it difficult to negotiate acceptable pension plans, and in the absence of any general wage increase program these locals are without a remedy for their pensions.

Work Stoppages Continue

A 24-hour work stoppage at the Akron plant of General Tire because of a dispute on a job assignment was reported April 6. Workers protested the company's "borrowing" of workers from other departments for beadroom rush work.

On April 18 a wildcat strike of Banbury crews at the Akron Goodyear Plant #1 over rearrangement of operations idled 2,500 production workers for several days. The company suspended 22 of the Banbury crew workers for seven days on April 17 for refusing to work when 12 were transferred to work in other departments. The impartial umpire for the company and the union refused to hear the grievance until all the workers returned to work, and it was reported that a hearing was set for April 25, the day after the end of the seven-day suspension of the Banbury crew workers.

At the Akron Goodrich plant a work stoppage was threatened when 32 workers were suspended in the timekeeping department for staging a wildcat strike in protest over a job reclassification. The local union president urged other workers, who staged a picketing demonstration on April 19, to resume work pending company-union negotiation of the dispute.

Two strikes in Fremont, O., at the plants of the Fremont Rubber Co. and the Crown Rubber Co., which have been in effect since the latter part of March, prompted an appeal from the mayor of that city to all factions involved to return to work while details of new contracts are worked out. At the Fremont Rubber plant 300 workers are on strike over a union shop and wage increase dispute, and at the Crown plant 85 workers seek a 23¢-an-hour wage increase.

Mohawk Building in Colorado

The Mohawk Rubber Co., Akron, O., is erecting a $500,000 factory near Denver, Colo., to manufacture tire recapping and repair materials. Production is expected to start by early summer, and the site of the new unit provides sufficient land for further expansion.

An increased demand for tire recapping and repair materials, particularly in the West and Southwest, and high freight rates were leading motives in the establishment of Mohawk's first plant outside of Akron.

The company, which manufactures truck and passenger tires and tubes and tire rebuilding materials, reported that last year 40% of its sales volume was in tire recapping stock and repair materials.

Officers Reelected

At the recent annual meeting of shareholders of Mohawk Rubber all directors were reelected: Robert H. Bishop, Ray E. Bloch, John A. Christie, Charles W. Enyart, Walter L. Flory, Kent A. Moody, Homer L. Rose, Charles E. Sauvain, and H. Lloyd Williams.

Directors then reelected Mr. Bloch president and general manager; Mr. Moody secretary; Mr. Sauvain treasurer; and Merle M. Huff, assistant treasurer. Mr. Christie is director of research.

Ford Ballantyne, Jr.

William Day

H. V. Powers

Quaker Rubber Corp., Philadelphia, Pa., manufacturer of mechanical rubber goods, recently opened a new stock carrying branch at 746 Lee St., S. W., Atlanta, Ga., under D. C. Vinson, formerly a field representative in the South for Quaker.

EAST

Wyandotte Chemicals Election

Election of Ford Ballantyne, Jr., to a vice presidency of Wyandotte Chemicals Corp., producer of industrial chemicals, Wyandotte, Mich., was announced April 25 by Robert B. Semple, president.

Mr. Ballantyne, 34, a descendant of Capt. John Baptiste Ford, founder of the company, has been assistant to the president and secretary of the corporation.

William Day, 45, head of the patent section of the research and development division, was appointed assistant to the president and director of the company's legal activities.

These promotions followed the annual shareholders' meeting.

Officers reelected included: Emory M. Ford, chairman of the board; Mr. Semple, president; Ford Ballantyne, Sr., vice president and treasurer; Ford Ballantyne, Jr., secretary; S. T. Orr, vice president-manufacturing; Bert Cremers, vice president-Michigan Alkali Sales Division; G. W. Schwarz, vice president-controller; and T. H. Vaughn, vice president-research and development.

The younger Mr. Ballantyne joined Wyandotte in 1942 after several years with the National Bank of Detroit. His first assignment at Wyandotte was to the staff of Vice President Orr, following which he became an assistant to the general vice president, assistant vice president, and in April, 1949, assistant to the president and secretary.

Mr. Day, a chemical engineer and attorney, came to Wyandotte in 1944 from a partnership in the Cleveland patent law firm of Oberlin, Limbach & Day. He has had wide experience in the chemical, rubber, plastic machinery and machine tool industries.

Powers Joins C. P. Hall Co.

H. V. Powers has been appointed to the technical sales staff of The C. P. Hall Co., chemical manufacturer for the rubber industry, Akron, O. Mr. Powers, who assumed his duties on March 1, has been in the rubber industry 34 years. For 30 years he was with the Goodyear Tire & Rubber Co., in production and development work including six years on the staff of Goodyear's Canadian plant. During his last 15 years at Goodyear he specialized in raw material selection and control. Prior to joining Hall, Mr. Powers was sales manager for J. J. White Products Co. He is also a member of the American Chemical Society, its Division of Rubber Chemistry, and the Akron Rubber Group.

Bristol Mfg. Corp., Bristol, R. I., on April 11 with fitting ceremonies opened its new $40,000 warehouse on Buttonwood St. The new fireproof structure, which contains 15,000 square feet of floor space, was begun last December to replace the warehouse destroyed by fire in November, 1946. Speakers at the dedication included Maurice C. Smith, Jr., president of the company, which manufactures footwear; James M. Stewart, plant engineer; Rev. Dale D. Dutton, vice president in charge of Christian relations; and Wm. H. Smith, treasurer.

G-E Promotes Patterson

James R. Patterson has been appointed West Coast manager of the chemicals division of the chemical department of General Electric Co., Schenectady, N. Y., according to J. L. McMurphy, manager of the division at Pittsfield, Mass. Mr. Patterson succeeds C. S. Ferguson, who recently resigned. Mr. Patterson, whose headquarters will be at the Anaheim, Calif., plant of the chemicals division, will have charge of engineering, manufacturing, and sales of division products on the West Coast and in the inter-mountain states.

Mr. Patterson, after graduating from Lafayette College in 1930, joined G-E and has served in various capacities, all connected with chemistry at the company's plants in Philadelphia and Erie, Pa., and in the research laboratory and the chemical division plant in Schenectady. At the time of his recent appointment he was an engineer in the field of G-E Glyptal alkyd resins, plasticizers, and wire enamels. During World War II, Mr. Patterson did consulting and engineering work on organic finishes for the War and Navy Departments and for the Maritime Commission. He has written several technical articles on alkyd resins, colloid chemistry, and silicone resins as well as on decorative and protective coatings and finishes.

Nicholas Kondur has been named manager of mold manufacture of the plastics division of G-E's chemical department. Mr. Kondur was formerly assistant to the president of Douglas Tool Co. and previously had worked for Ford, the United States Navy Department, Frederick Coleman & Sons, the AMCO Gauge Co., and Valor Tool & Machine Co.

Seiberling Rubber Elects

Willard P. Seiberling, secretary of Seiberling Rubber Co., Akron, O., and a son of F. A. Seiberling, 90-year-old founder of the company who recently retired as board chairman, was elected a director at the annual meeting of stockholders on April 10.

At a reorganization meeting following the stockholders' meeting, all company officers were reelected, but no board chairman was named to replace F. A. Seiberling. Officers reelected were: J. P. Seiberling, president; J. L. Cochrun, executive vice president; H. P. Schrank, vice president in charge of production; L. M. Seiberling, vice president in charge of sales; R. J. Thomas, vice president and treasurer; C. E. Jones, vice president and comptroller; Willard P. Seiberling, secretary; H. E. Thomas, assistant secretary-treasurer; J. W. Dessecker, assistant secretary; and W. H. Oburn, assistant treasurer.

Eight directors were named to the board besides Willard P. Seiberling. They are A. C. Blinn, Robert Guinther, T. Tyler Sweeny, J. L. Cochrun, H. P. Schrank, R. J. Thomas, and J. P. and L. M. Seiberling.

President Seiberling told stockholders he expects a "greatly improved" year of sales and earnings this year and said that results so far have been "encouraging." He added that the prewar curve of increasing business in warm weather is "definitely" returning to the replacement tire business.

The industry, he said, "badly needs a price increase of at least 10%" because of higher costs and added that the increase was "inevitable" before midsummer.

Safety Exposition

The Twentieth Annual Safety Convention and Exposition, sponsored by the Greater New York Safety Council and cooperating agencies, was held March 28-31 in the Hotel Statler, New York, N. Y. The exposition included displays by some 84 companies of both new and standard safety equipment of all types. Rubber and plastics appeared in such applications as gloves, goggles, masks, respirators, mats, boots, shoes, and protective clothing. Exhibitors of such items included American Optical Co.; Bausch & Lomb Optical Co.; A. N. Brabrook Co.; Chem-Wear, Inc.; Guardian Safety Equipment Co.; Milburn Co.; Miller Products, Inc.; Olympic Glove Co.; Pulmosan Safety Equipment Corp.; Safety Clothing & Equipment Co.; Scott Aviation Corp.; Standard Safety Equipment Co.; Surety Rubber Co.; United States Safety Service Co.; and Willson Products, Inc.

General's Super Squeegee tire and puncture-sealing safety tube were shown by New York General Tire Co., Inc. Dow-Corning Corp. featured its Sight-Savers, eyeglass cleaning tissues impregnated with silicone resin. Safety valves and accessories for pneumatically powered machinery were displayed by A. Schrader's Son, Division of Scovill Mfg. Co., Inc. Safety shoes with rubber soles and heels were exhibited by Knapp Bros. Shoe Mfg. Corp.; Lehigh Safety Shoe Co., Inc., Melville Shoe Corp.; Safety First Shoe Co.; and Sundial Shoe Co.

The convention marked two decades of progress in safety engineering, with the four-day program including 42 separate sessions at which 120 papers were presented and 11 panel discussions held. The program also featured the showing of safety films, the presentation of safety awards, two luncheon sessions, and the annual dinner on March 30.

New Cameron Directors

Charles A. Walmsley and Edwin P. Stevens have been elected to the board of Cameron Machine Co., 61 Poplar St., Brooklyn 2, N. Y., manufacturer of slitting and rewinding machinery. The appointments were made at the directors' meeting on April 20 at the company's Brooklyn plant.

Mr. Walmsley has been with Cameron since June, 1949. He started as special assistant to the president and was made vice president in charge of production in October, 1949. Prior to joining Cameron he had been works manager for International Derrick & Equipment Co.

Mr. Stevens is a partner in the law firm of Winthrop, Stimpson, Putnam & Roberts and is a member of the New York Bar Association and of the board of managers of the William Sloan House.

Hercules Powder Co., Wilmington, Del., has appointed Lawrence J. Finnan, Jr., director of purchases, to succeed Andrew Van Beek, who rejoins the company's explosives department to take over matters concerning government contracts, the operation of government owned plants, and other problems relating to national defense. Mr. Finnan joined Hercules in 1915 as a clerk in the purchasing department, was later promoted to the position of buyer, and since December, 1929, has served as assistant director of purchases.

Building New Research Lab

Construction of an applied research laboratory — third unit in the multi-million-dollar B. F. Goodrich Chemical Co. installation at Avon Lake, O. — begins this month, according to W. S. Richardson, company president. Mr. Richardson said the new laboratory is a further step in the company's research and development program and will broaden and improve technical service and material evaluation facilities presently located in Cleveland.

A general chemicals plant and experimental station are already in operation.

The new one-story building will cover 17,500 square feet and will have separate materials and processing laboratories, a compounding room, Banbury mixing room, controlled temperature test room, offices and conference rooms, Mr. Richardson stated. The technical staff will have the most efficient electrical, chemical, and mechanical testing apparatus for conducting general evaluation studies on thousands of products and materials, it was also said.

"A primary function of the new laboratory will be the continuation of a unique sales service whereby our customers and prospective customers have been able to enlist confidential cooperation of our development staff in the analysis and solution of technical problems related to the use of our chemicals, plastics, and American rubbers," Mr. Richardson explained.

Eagle-Picher Elections

At the regular annual meeting of shareholders of The Eagle-Picher Co., held March 28, in the company headquarters in the American Bldg., Cincinnati 1, O., the board of directors was reelected for the coming year, including Vincent H. Beckman, Arthur E. Bendelari, Joel M. Bowlby, Carl A. Geist, Carl F. Hertenstein, Joseph Hummel, Jr., Elmer Isern, Robert E. Mullane, John J. Rowe, T. Spencer Shore, and Miles M. Zoller.

All officers of the company also were reelected, as follows: Mr. Bowlby, chairman of the board; Mr. Shore, president; Mr. Geist, vice president, secretary, and treasurer; and William R. Dice, vice president and comptroller.

Timken Advances Two

Timken Roller Bearing Co., Canton, O., has announced that J. R. Comber, former manager of the sales order division, has been named to head the Canton office of the automotive division and, in addition, will handle special sales administration assignments. At the same time E. H. Hughes, systems department manager, was appointed manager of the sales order division.

Mr. Comber has been with Timken since 1913, starting as a clerk. He later worked in the cost, payrool and production departments until 1918, when he was placed in charge of the sales order division.

Mr. Hughes came to Timken in 1938. Starting in general accounting department, he moved to the credit department, then to sales order, and has been for the past several years head of the systems department.

Associated with Mr. Hughes in the sales order division are T. J. Wayne, manager automotive orders; H. P. Dickerhoff, manager industrial orders; and J. L. Brown, manager bearing order control.

Executive Changes at Koppers

Gen'l Brehon Somervell, president of Koppers Co., Inc., since May, 1946, on March 27 also was named chairman of the board. His election came at the annual directors' meeting following the retirement of J. P. Williams, Jr., as company chairman.

Mr. Williams, with Koppers and its predecessors since 1920, was elected president of Koppers Co. and executive vice president of Koppers United Co. in 1939. From 1944 to April, 1946, when General Somervell became president, Mr. Williams served as president and chairman of the board of the present company. Last May, Mr. Williams announced his retirement from active management of the company, but retained the chairmanship. He still remains a director.

W. F. Munnikhuysen, vice president and general manager of the company's Wood Preserving Division, was made executive vice president of the company through additional action approved by the board. He has at various times been connected with three of the company's six divisions and has a wide knowledge of its operations. In his new position Mr. Munnikhuysen will be the second highest executive officer of the company.

Earlier in the day stockholders of Koppers, in their annual meeting, elected two new members to the board of directors and authorized it to revise the company's retirement benefit plan for hourly paid employes.

The new members of the board are Mr. Munnikhuysen and Joseph Becker, vice president and general manager of the engineering and construction division. Mr. Becker's connection with Koppers began in 1910, and he has been chief executive of the engineering and construction division since 1925.

Provision for increasing the membership of the directorate from nine to 11 was made recently through an amendment to the by-laws of Koppers. Nine present members of the board were reelected at the stockholders' meeting.

General Somervell came to Koppers as its president in 1946 after a notable career in the Army and was elected a director the same year. He has guided the postwar expansion of the company, including its entrance into the field of synthetic organic chemicals and enlargement of the scope of its engineering and construction services in this country and abroad. Under his leadership the company has conducted a program of plant expansion and improvement costing more than $35,000,000.

Mr. Munnikhuysen was graduated with a Civil Engineering degree from Cornell University and then accepted a position with the Koppers Construction Co. In 1930, after 14 years in the construction business, he was made vice president and director of the Connecticut Coke Co., which at that time was alined with Koppers interests. In 1935 he became vice president of the Wood Preserving Co. and three years later its president. Since integration of that company's activities with those of the Koppers Wood Preserving Division, he has been general manager of the division and has directed the production and sales of all Koppers Wood Preserving plants, which now number 22.

New York Rubber Corp. on April 8 moved its executive and New York sales offices from the Empire State Bldg. to 100 Park Ave., New York 17, N. Y.

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Raymond H. Blanchard

Blanchard Hood President

Raymond H. Blanchard has been elected president of the Hood Rubber Co., Watertown, Mass., it was announced by John L. Collyer, president of The B. F. Goodrich Co., of which Hood is a division. Vice president-manufacturing of Hood Rubber since 1932, Mr. Blanchard succeeds the late C. L. Muench as the company's fourth president.

Mr. Blanchard joined Hood in 1917, after graduating from Massachusetts Institute of Technology. He directed the mixing and reclaiming departments and later became production superintendent.

He also is vice president and director of the First National Bank of Malden, a director of the Norfolk & Dedham Mutual Fire Insurance Co. of Dedham, a trustee of the Melrose Savings Bank, and a member of the Massachusetts Institute of Technology Corp., American Chemical Society, American Institute of Chemical Engineers, American Legion, and Algonquin Club. During World War I, Mr. Blanchard served in the Chemical Warfare Service. In World War II he was a member of the Greater Boston War Manpower Committee and was on the National War Stabilization Board for Region I.

Adds to Sales Staff

Two new appointments to positions in the sales department of The Mansfield Tire & Rubber Co., Mansfield, O., were announced last month by E. E. Stevens, general sales manager. They involve C. A. Eaves, Jr., and H. B. Culbertson.

Mr. Eaves has been named sales manager of special accounts as successor to the late Charles F. Orr, Jr. Tire merchandiser in the T.B.A. department of Sun Oil Co., Mr. Eaves was instrumental in the organization of Sun's postwar tire merchandising program. He also had been with the Firestone Tire & Rubber Co. in wholesale and retail merchandising capacities, principally in New England.

Mr. Culbertson, who becomes a special representative in Mansfield's sales department, is a veteran of 29 years in the tire industry. He formerly was manager of the associated lines' eastern division for The B. F. Goodrich Co. and has been stationed in Minneapolis, Chicago, Atlanta, Ga., Charlotte, N. C., and Akron.

Withers Joins Morton Company

Joseph R. Morton, president of Morton Chemical Co., Greensboro, N. C., has announced a change in corporate name to Morton-Withers Chemical Co., with the addition to the concern of John P. Withers as vice president and secretary, who will give special attention to production and research.

Coincident with the change in name the company has increased its capital stock and working capital to add $100,000 to its resources. The firm is currently installing a new steam plant and a water cooling system in order more effectively to take care of increased production.

Mr. Morton, founder of the company, continues as president and treasurer and will devote his efforts to general management and sales promotion.

Mr. Withers attended the University of North Carolina and Massachusetts Institute of Technology. He spent 12 years with Esso Standard Oil Co. in both the petroleum and chemical divisions. The first few years were with Standard Oil Development Co., where he was involved with engineering and production research. During the war he was loaned to the government and served with Petroleum Administration for War as a Coordinator on the Aviation Gasoline and Synthetic Rubber Chemicals Program. Following his return to Standard Oil, Mr. Withers served in the management coordination end of the chemical products division.

Morton Chemical Co. has a background of 19 years in the production of textile auxiliaries, including a wide range of products as wetting, rewetting, and dispersing agents, finishes, coatings, etc. In the last few years considerable work has been done on materials for other than the textile trade, including esters, emulsifiers, and auxiliaries for other industries. Last fall the company embarked upon a program of considerable diversification, with operations extending into the plasticizer, fat splitting, paper, rubber, and petroleum chemical industries. In the plasticizer field, for instance, a new form of octyl phthalate has been developed for the plastics industry. New products, moreover, are being readied in connection with company owned processes for improved bonding of rubber to tire cord in rubber tire manufacturing and for the incorporation of rubber or other plastics in paper.

Du Pont Transfers Two to Akron

The rubber chemicals division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has named J. C. Carl and R. G. Keeping to the technical staff of the Akron, O., service laboratory. Mr. Carl was appointed as a specialist in natural and synthetic latex compound development, and Mr. Keeping as latex chemist. Both were transferred from du Pont's rubber laboratory at Deepwater Point, N. J.

Mr. Carl had been engaged in latex research development for 11 years with the Firestone Tire & Rubber Co. He served two years as senior chemist at the Liberian Plantation. More recently, he was associated with the Anderson Rubber Co. and the Caram Chemical Co. He came to du Pont last year.

Mr. Keeping was with Wyeth, Inc., for four years before joining du Pont in 1947 to engage in laboratory development and production supervision of dyes and, later, he was transferred to latex compounding research.

General Tire Plant for Israel

Establishment of a rubber manufacturing company in the State of Israel to produce tires, tubes, and allied products was announced recently by Arthur Lourie, Consul General of Israel, and Cyril F. O'Neil, vice president in charge of foreign operations of The General Tire & Rubber Co., Akron, O. The new company, The General Tire & Rubber Co. of Israel, will be capitalized at about $2,000,000. Authorization for its formation came recently from David Horowitz, Director-General of the Israel Ministry of Finance.

"Plans for General's operations in Israel are similar to our successful operations in Chile, Venezuela, Portugal, South Africa, Mexico, and Canada," Mr. O'Neil pointed out. "Our operations in these countries where we are minority stockholders, but supply the plant management, technical 'know how,' formulas, and processes, have been excellent," he explained. "The capital for this new company will be supplied by American and Israel investors."

Construction of the new plant will begin in the near future, as soon as details of incorporation have been completed. The site will be in the vicinity of Haifa, and the plant itself will be one of the most modern tire and tube plants outside of the United States—and the only tire and tube plant in the Middle East. The actual plant facilities will cover approximately 90,000 square feet, similar to General's other foreign affiliates.

When completed, the plant will be a single-floor operation capable of producing between 80,000 and 100,000 tires and tubes annually. Initially the plant will employ some 300 persons. American-made equipment will be shipped to the new plant site late this year in time for production to begin early in 1951.

Joseph Andreoli, vice president of General's foreign management staff has returned to the United States following completion of arrangements for the formation of the new company.

Stockholders, Directors Hold Meeting

Shareholders of General Tire last month elected four new directors at their thirty-fourth annual meeting, as follows: E. W. Ross, John Creamer, B. E. Smith, and M. G. O'Neil.

Directors reelected were: W. O'Neil, L. A. McQueen, W. E. Fouse, S. S. Poor, T. F. O'Neil, Robert Iredell, John O'Neil, C. J. Jahant, C. F. O'Neil, and Hayes R. Jenkins.

Howard W. Jordan submitted his resignation from the board in March.

At the board's annual meeting, which followed the shareholders' meeting, W. O'Neil was renamed chairman, president, and general manager.

Other officers elected were: McQueen, Poor, C. F. O'Neil, and Jahant, vice presidents; T. S. Clark, treasurer; Jenkins, secretary; James Little, assistant treasurer; and Frank W. Knowlton, assistant secretary.

M. G. O'Neil, son of W. O'Neil, is the board's youngest member at 28. Since returning from military service, M. G. O'Neil has been connected with General's treasurer's office and the foreign plant operations.

Personnel Promoted

B. L. Crowe has been advanced to manager of new accounts in the southern division of General Tire and is succeeded as territory manager in southern Alabama and northwestern Florida by C. E. Williams.

Mr. Crowe, a General sales representative for the last five years, will continue his headquarters in Montgomery, Ala.

Mr. Williams attended Georgia Military College and was an infantry major during World War II. He also will make his headquarters in Montgomery.

A veteran of 21 years in the tire business, A. T. Morgan has been appointed territory manager in central Pennsylvania for General Tire. He will headquarter in Harrisburg and work out of the company's Philadelphia branch under Manager Richard Graybill.

James J. Cropp has been made office and credit manager of Pennsylvania Rubber Co.'s central division. Mr. Cropp, with headquarters in Chicago, started with General Tire in 1944 as assistant works accountant of the company's wartime Huntington, W. Va., plant. In March, 1946, he was assigned to the comptroller's office in Akron and was appointed manager of the company's accounts payable department in March, 1947. Then from May, 1949, he was on a roving assignment with the company until his new appointment.

Pennsylvania Rubber is a subsidiary of General Tire.

Edward J. Maitland has been named a territory representative for General Tire, to cover southwest New York and northern Pennsylvania.

Calco Adds to Staff

Recent additions to its staff were announced last month by the Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J. Technical appointees to the manufacturing department include: H. M. Carleton, B. S. Ch.E., Northwestern University, '47; P. B. Sheridan, B.S. Ch.E., Columbia, '49; W. H. McCammon, B.S. Ch.E., Purdue, '50; R. L. Kelley, A.B. Chem., Harvard, '50; G. L. Smith, B.A. Chem., Williams, '49; M. Papier, A.B. Chem., Upsala, '49; to the chemical engineering department: G. Marlowe, Ph.D. Ch.E., M.I.T., '50; to the process development department: S. Sepoci, B.S. Chem., Wisconsin, '49.

William B. Hardy has been made a sectional director in the chemical research department, in charge of the entire research program in the field of vat dyes. Dr. Hardy started in the Calco research organization, where he worked under the various sections, including analytical and organic. He was promoted to a group leader and in this position was primarily responsible for developing Calco's extensive new line of soluble vat dyes.

Stein, Hall & Co., Inc., 285 Madison Ave., New York 17, N. Y., has announced that owing to the serious illness of J. Rexford Adams, vice president and manager of the dry adhesives department, it will be many months before he will again be on active service with the company. Therefore, the liquid and dry adhesives departments have been consolidated under the direction of Roger Shoals, who joined the company in 1945. He had previously been with the Pneumatic Scale Corp. and prior to that had covered the southern territory for Victor G. Bloede Co., a subsidiary of LePage's, Inc.

Paul Kaplan, of the New York sales branch, joins Mr. Shoals in the sales work of the department. Eugene Thompson and Fred Schepper will both continue their present administrative functions in the combined departments.

Wooster Rubber Expanding

Shipments of "Rubbermaid" housewares in the first quarter were 106% above those for the same period in 1949, The Wooster Rubber Co., Wooster, O., reported April 19.

The rise continued the rapid growth of demand for the company's products since the war—which last year resulted in an overall increase of 84%, including a rise of 129% in sales through jobbers and 51% in sales through department stores. In 1948, sales rose 58% over those of 1947.

Officials of the company announced that new plant facilities, including a two-story structure with more than 52,000 square feet of storage and shipping space, are being added to help the firm keep up with demand. Last year the company increased its production capacity by about 53%.

The new production and warehousing facilities will permit faster shipments to jobber and department store customers, help smooth out seasonal employment ups-and-downs, and accommodate larger inventories of finished goods on hand for peak-season orders. Announcing plans for completion of the new warehouse building by July, Wooster Rubber President James R. Caldwell noted that the trend in retail merchandising is toward smaller store inventories and more frequent reorders.

Snell Expanding Services

Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., according to President Foster Dee Snell, has purchased the laboratories of the G. C. Supplee Research Corp., Bainbridge, N. Y. The purchase amplifies the consulting research work of the Snell organization by giving it an integrated unit for a supply of rats and the running of vitamin determinations on animals. The Bainbridge laboratories will continue their operations with present personnel and will supply animals to laboratories, universities, and research organizations throughout the country, in addition to conducting vitamin assays and evaluations.

The company also announced a further expansion of services rendered to clients abroad, in that it has recently affiliated with Albert C. Barrat, Neuilly, France. Mr. Barrat will represent the Snell organization in France and also act as a qualified foreign consultant to clients in the United States.

Two addresses by Snell employes were recently given at the New York University School of Education as part of a new course entitled "Recent Advances in Science Pertaining to the Home." Cornelia T. Snell, research group director, spoke on "Evaluation of Synthetic Detergents"; while Leonard C. Cartwright, in charge of product evaluation and physical measurements, spoke on "Organoleptic Panel Testing as a Research Tool."

Baker Castor Oil Co., 120 Broadway, New York, N. Y., on April 18 held a board meeting at which the following company officers were elected: president, I. M. Colbeth; vice president, H. H. Fritts, C. F. Kidd, A. M. Dietrich, F. D. Wilson; secretary, J. B. Henrich; treasurer, D. R. Finn; assistant secretary, R. E. Maskiell, M. K. Smith, B. E. Leyrer, T. H. Blackbourn; assistant treasurer, R. Fabry, F. J. Kelly.

Opens Textile Research Laboratory; Other U. S. Rubber Announcements

A new $250,000 textile research and development laboratory in Winnsboro, S. C., was opened April 20 by United States Rubber Co., Rockefeller Center, New York 20, N. Y. Dedication of the laboratory was marked by a series of open-house events for employes and residents of the area, beginning with a visit on April 20 by a group of executives headed by Harry E. Humphreys, Jr., president of the company.

U. S. Rubber's New Textile Research Laboratory at Winnsboro, S. C.

Opening of the laboratory brings together a staff of more than 25 research men and women in a consolidation move designed to improve and expand the company's textile operations. Practically all the company's textile research and development work will now take place at Winnsboro except research on asbestos products, which will continue at Hogansville, Ga., home of the company's Asbeston plant.

Development activities at the new laboratory will be closely coordinated with the product control laboratories of the company's mills, with the general laboratories at Passaic, N. J., and the fundamental research conducted by such organizations as the New Orleans laboratory of the United States Department of Agriculture and the Textile Research Institute at Princeton, N. J.

Pilot-plant facilities to serve all mills of the textile division have been installed in the laboratory. Other facilities include a physical testing laboratory, chemical laboratory, machine shop, statistical department, technical library, conference room, and various offices.

New yarn and fabric developments of the company's textile research staff have enabled the company to keep most of its employes working steadily during recent periods of readjustment in the textile industry, said H. Gordon Smith; vice president and general manager of the company's textile division.

"The company has had 33 years of experience in the production of textiles," Mr. Smith said. "Beginning with the production of tire cord, the company expanded its operations to produce textiles for Lastex yarn, for conveyer belts, hose and other consumer and industrial products.

"Textile development work, which started at the company's general laboratories, was augmented in 1938 with the establishment of the textile division's own central development department at Hogansville. Since that time the company has successfully introduced Ustex, a chemically treated cotton yarn made 70% stronger than conventional yarn; Asbeston fire-resistant fabric for ironing board covers and fire fighting suits; Carosel asbestos-cotton dish towels, and many improvements in tire cord, belting duck, and other established products.

"Recently rayon, because of its greater strength and lower cost, has almost completely replaced cotton in tires."

Mr. Smith added that the equipment not used to produce rayon tire cord was converted to other uses, rather than liquidated.

"Two years ago we introduced Rubiyarn cotton ginhams and rayon suitings and dress goods. Last year the production of these fabrics was stepped up considerably, and we are now turning out denims for sportswear and bedroom ensembles, cotton ticking for mattresses and experimental fabrics and yarns from such synthetic fibers as Dynel.

"This long-range program has provided continued employment for approximately 1,300 people formerly engaged in cotton tire cord production. Much of its success has been due to the achievements of our development department.

"The construction of the new laboratory is designed to carry out this program even further, thus affording a continued expansion of the company's textile operations," Mr. Smith concluded.

S. H. Sherman, development manager for the textile division, is in charge of the new laboratory.

Neal Truslow has been appointed supervisor of product development for U. S. Rubber's textile division development department. He will have his headquarters at the company's new textile research laboratories in Winnsboro. Mr. Truslow will be responsible for the textile division's new product development other than Asbeston, and his duties will also include the direction of the chemical laboratory at Winnsboro.

Mr. Truslow, a graduate of Johns Hopkins University in chemical engineering, was formerly with Chicopee Mfg. Corp., where he was engaged in textile research. He is a member of the American Institute of Chemical Engineering and the American Assn. of Textile Chemists & Colorists.

Renews Fellowship Grants

Graduate fellowships in chemistry established at 10 leading universities by U. S. Rubber have been renewed for the coming academic year, President Humphreys announced recently. Participating universities are: California Institute of Technology, Cornell University, Harvard University, Massachusetts Institute of Technology, Northwestern University, University of California, University of California at Los Angeles, University of Chicago, University of Minnesota, and University of Wisconsin. The fellowships will be available for the academic year starting July 1, and the fellows will be selected by the universities in accordance with their established practices and will not be restricted in the choice of position after expiration of their fellowships. At the same time it was also announced that a fellowship in physics at the University of Virginia had also been renewed for the coming academic year. This is the fourth year that the fellowships have been sponsored by U. S. Rubber.

Concerning Personnel

Bernhard N. Larsen has been made development engineer and technical service representative for rubber chemicals, according to F. D. Chittenden, development manager for the Naugatuck Chemical Division. Mr. Larsen joined the Fisk Rubber Co. in 1926 as a chemist in its laboratories. He was chief chemist with Seiberling Rubber Co. in Canada and recently was in charge of tire construction with the Armstrong Tire & Rubber Co., West Haven, Conn. In his new position Mr. Larsen will make his headquarters at Naugatuck, Conn. He is a member of both the New York and Connecticut Rubber groups.

Harold M. Winton has been made director of training for the mechanical goods division. He will supervise all training activities in the division's plants at Fort Wayne, Ind., Passaic, N. J., Bristol, R. I., Philadelphia, Pa., Sandy Hook, Conn., and in 27 sales branches in principal U. S. cities. He will make his headquarters in the company's general offices at Rockefeller Center.

Regis W. Higgins has been named assistant sales manager of golf balls at U. S. Rubber. Mr. Higgins started with the company in December, 1939, as a salesman of general products in Kansas City and early in 1942 was promoted to chief clerk in the St. Louis branch. After a later sales assignment in San Francisco, in April, 1947, he was appointed sales manager of general products in the Detroit district.

Hubert O. Fry has been appointed sales representative for combed and carded yarns, with headquarters in Chattanooga, Tenn. He will assist H. E. Anderson in covering Tennessee, Alabama, and Georgia. Before joining U. S. Rubber, Mr. Fry was production manager of the Central Franklin Process Co.

Herbert E. Smith, chairman of the board of U. S. Rubber, is again serving in this year's Greater New York Fund campaign as chairman of the rubber division.

U. S. Rubber had fewer lost-time accidents in 1949 than any other year on record, according to Ernest W. Beck, company safety supervisor. Lost-time accidents for 1949 totaled 347; while the previous lowest figure had been 522 recorded in 1948. The company has been keeping safety records since 1921, a year in which there were 1,080 lost-time accidents. The company's accident frequency rate in 1949 was 4.04, compared with 5.05 for the previous year. According to Mr. Beck, the improvement is due to increased emphasis on this phase of industrial operation by the company management. The company is carrying on an extensive educational program to make employes more safety conscious and is intensifying efforts to eliminate hazards through the installation of safety devices.

U. S. Rubber recently sent a "rubber dollar" to each of its 50,000 employes in this country as part of a broad information program designed to help employes understand what makes business tick. The "dollar" shows how the company spent the $517,-439,676 which it collected from customers in 1949. It shows that 57.5¢ out of every dollar went for materials and services; 35.5¢ for employes' pay and benefits; 2.5¢ for wear and tear; 1.5¢ for income taxes; 2¢ for dividends to stockholders; and 1¢ for profit put back into the business. The "dollar" was enclosed with the April copy of the company's monthly employee publication, *Us* magazine, which also contains a nine-page story outlining the 1949 annual report in detail.

Goodyear Holds Annual Meeting

A new pension plan which provides company-paid benefits for 30,000 hourly rated and 14,000 salaried employes was approved by stockholders of The Goodyear Tire & Rubber Co. at their fifty-first annual meeting in Akron on March 27. The plan, which provides minimum pensions of $100 a month, became effective April 1, subject to approval of the Commissioner of Internal Revenue.

The stockholders also reelected the company's 17 directors.

At the board meeting, P. W. Litchfield was reelected chairman of the board and chief executive officer. He has been chief executive officer of the company since 1926 and continuously a director since 1906.

E. J. Thomas was reelected president of the company; while Howard L. Hyde, general counsel and assistant secretary, was elevated to the post of vice president and general counsel.

Other officers reelected were: R. S. Wilson, P. E. H. Leroy, R. DeYoung, J. M. Linforth, R. P. Dinsmore, F. W. Climer, vice presidents; Z. C. Oseland, treasurer; W. D. Shilts, secretary; C. H. Brook, comptroller; H. W. Hillman and J. F. Bennett, assistant treasurers; W. M. Mettler, assistant secretary; H. D. Hoskin, H. L. Riddle, and J. E. Caldwell, assistant comptrollers.

Expanding Vinyl Production

A $2,250,000 expansion program to quadruple the output and enlarge its lines of Pliovic vinyl resins for the plastics industry has been announced by Goodyear. The expansion will be made at the company's chemical division subsidiary, Pathfinder Chemical Corp., Niagara Falls, N. Y., according to Chairman Litchfield. Potential production figures were not released, but the expanded program is expected to place Goodyear among the nation's leading producers of vinyl resins.

Engineering and preliminary construction work at Niagara Falls is already under way, Mr. Litchfield said, and initial expanded production is scheduled to start before the end of the year. The existing processing buildings, which take acetylene and hydrogen chloride from nearby suppliers by pipeline, will also be enlarged to handle the increased output.

According to R. P. Dinsmore, vice president in charge of research and development, the present line of Pliovic resins will be greatly expanded. Considerable work has been done in the company's research and development laboratories in Akron on additional resins for specific uses. Under the new program, Dr. Dinsmore said, a plastic manufacturer will be able to obtain Pliovic "tailored" or modified during its production process to meet his particular needs.

Litchfield, Company Honored

The insignia of the Royal Order of Vasa, recently conferred on Goodyear Board Chairman P. W. Litchfield by King Gustav of Sweden, was formally presented to Mr. Litchfield on March 27 by the Swedish Consul General, G. Oldenburg. The presentation was made following the company's annual stockholders' meeting and was attended by Goodyear officials and representatives of Goodyear Foreign Operations, Inc. The Order is awarded to Swedish and foreign subjects for merit and outstanding service in the fields of industry, commerce, economics, and the professions. Mr. Litchfield was honored for his interest during many years in developing close business relations of mutual business benefit to both Sweden and the United States. Goodyears' plant in Sweden, Goodyear Gummi Fabriks Aktiebolog, was officially opened in May, 1939. Originally designed to produce 500 tires daily, the plant was recently expanded and now employs some 400 Swedish workers who produce 700-800 tires and thousands of rubber heels each day. The plant also produces tubes and Neolite shoe soles.

Goodyear's "The Greatest Story Ever Told," radio's most honored program, received another award when the readers of *Radio and Television Mirror* selected it as their favorite religious program. A scroll certifying this honor was presented to R. S. Wilson and J. K. Hough, Goodyear vice president and advertising director, respectively, by Doris McFerran, editor of the magazine.

National Safety Council pennants for outstanding safety records are now flying over all domestic Goodyear plants. The emblems were given to the company to symbolize the award of the Distinguished Service to Safety plaque by Council President Ned Dearborn at recent ceremonies in Goodyear theater. The plaque was accepted by Russ DeYoung and J. T. Kidney, Goodyear vice president and safety director, respectively. The honor was paid Goodyear for its 1949 record of reducing accident frequency by 39%, accident severity by 20%, number of accidents by 48%, and lost-time days by 32%. The award covered a total employment of some 40,000 persons for almost 73,000,000 man-hours.

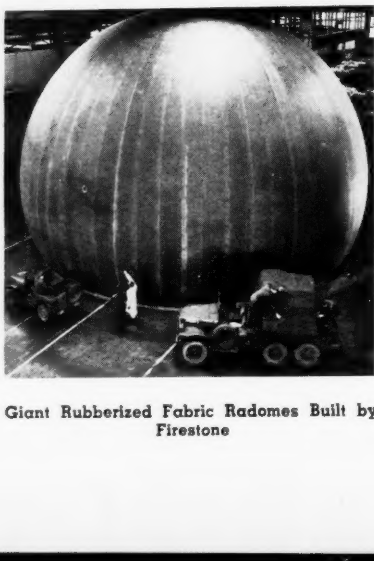
Firestone Activities

Completion of a new textile plant in Buenos Aires, Argentina, was announced last month by L. R. Jackson, president of The Firestone Tire & Rubber Co., Akron, O.

"Rayon and cotton produced in Argentina will be twisted and woven in the new plant for use in tires manufactured by Firestone at Buenos Aires," according to Mr. Jackson.

Construction of the new factory was begun during 1949. When operating at capacity, the plant will employ approximately 300 workers.

Rubberized fabric radomes are being made by Firestone to protect Air Force radar installations from wind, snow, sleet, and ice. Rayon, nylon, or fiber glass fabric is covered with rubber to make the outer skin of the giant radome, which measures 167 feet in circumference and 36 feet in height. The radome is mounted atop a 25-foot tower and inflated to half a pound air pressure, without metal or wood supports of any kind. When so inflated, the radome is designed to withstand wind of 120 m.p.h. By flexing, the structure will shake off ice and snow from its rounded surface. When deflated, the entire radome packs into a canvas bag similar to the one shown in the army truck in the accompanying photograph.



Giant Rubberized Fabric Radomes Built by Firestone

Roger S. Firestone, president of Firestone Plastics Co., Pottstown, Pa., was host at a reception given by the company on April 10 to a group of nearly 200 New York manufacturers and eastern buyers of Velon plastic film products. The reception followed the "Voice of Firestone" radio and television show and was held in the Rainbow Grill of the RCA Bldg., New York, N. Y. The guests were also present during the show which featured a commercial during which Velon film products were demonstrated and described. Presiding at the reception were Mr. and Mrs. Firestone; Elmer French, general sales manager, and Mrs. French; K. L. Edgar, Velon film sales manager, and Mrs. Edgar; and E. T. Handley, manager of the Pottstown plant.

D. Goodrich Honored

The election of David M. Goodrich as honorary board chairman of The B. F. Goodrich Co. was announced April 19 following a meeting of the board of directors in New York, N. Y. For the past 23 years Mr. Goodrich was chairman of the board, in which position he is succeeded by John Lyon Collyer, president of the company since November, 1939. Mr. Collyer will serve as both chairman and president.

At the annual meeting of stockholders on April 18, Mr. Goodrich was reelected a director of the company, a post to which he was first elected in 1912. He continues also as a member of the executive committee. Mr. Goodrich is the son of Dr. Benjamin Franklin Goodrich, who founded the company in Akron, O., in 1870—the first rubber company west of the Alleghenies. Upon graduation from Harvard in 1898, Mr. Goodrich joined Theodore Roosevelt's Rough Riders as an enlisted man and served in the Spanish-American War, attaining the rank of lieutenant. In World War I he served as a lieutenant colonel on the General Staff of the AEF. After the Armistice he helped to organize the Inter-Allied Games. He was, furthermore one of the founders of the American Legion.

At the meeting of the board of directors Mr. Goodrich was cited for his "long and valiant service both to The B. F. Goodrich Co. and to American industry."

Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O., on April 11 held its annual stockholders' meeting, at which all directors were reelected. Then the board convened and reelected all officers of the company. President Raymond F. Evans reported an upturn in sales and earnings for the first quarter, with prospects good for continued improvement in the second quarter of 1950. Diamond's first quarter improvement is attributable mainly to improved efficiency of newer plants and to a reduction in extraordinary costs in connection with start-up of new facilities.

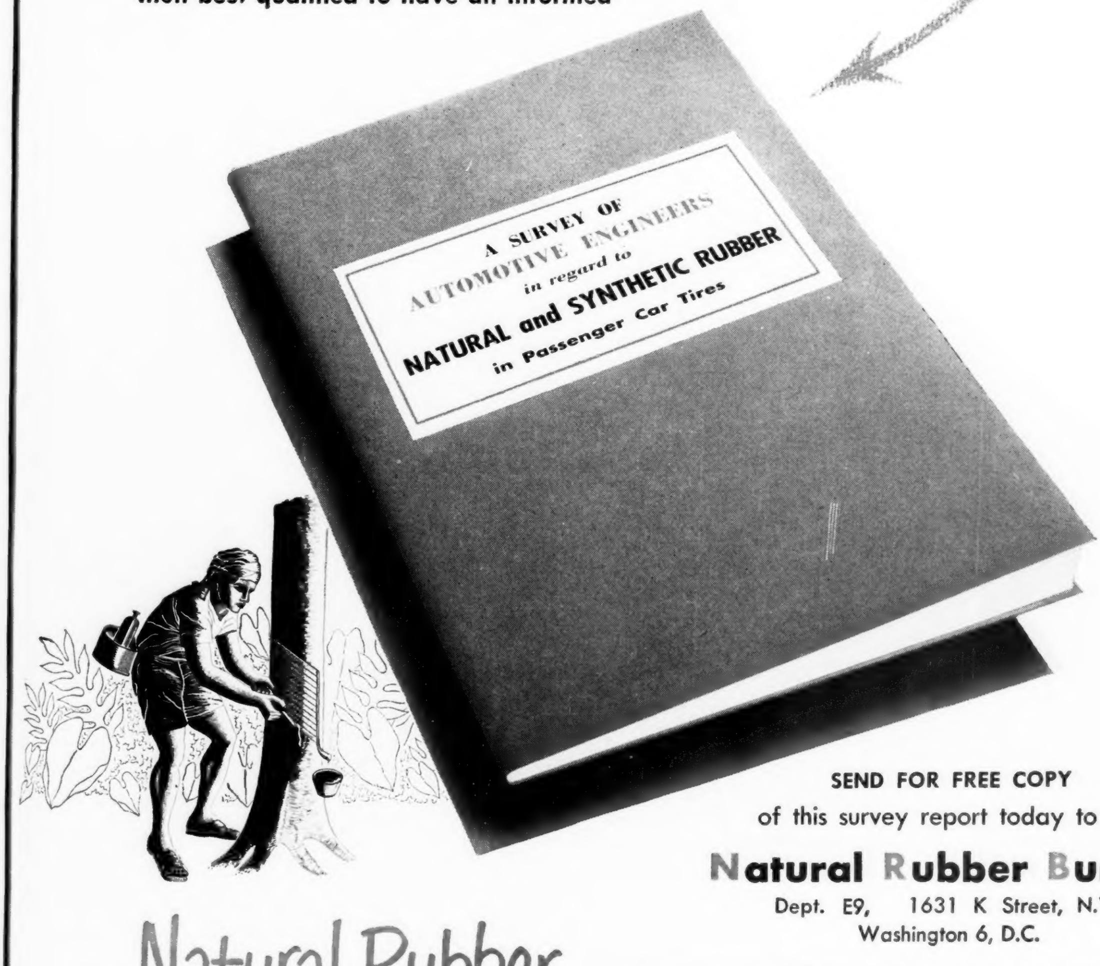
Would You Like to Know What America's Leading Automotive Engineers Think of Natural Rubber?

The growers of natural rubber in Southeast Asia wanted the facts. They wanted to know the truth about natural rubber in tires.

So they asked National Analysts, Inc., a distinguished research firm in Philadelphia, to find out — without favor or prejudice.

National Analysts went directly to the men best qualified to have an informed opinion on the subject — the automotive engineers whose job it is to select and test tires for original equipment on America's cars.

Here is their answer — the complete report by National Analysts on interviews with automotive engineers in the 14 companies who make 99% of the automobiles in the U.S.



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of this survey report today to the

Natural Rubber Bureau

Dept. E9, 1631 K Street, N.W.
Washington 6, D.C.

Natural Rubber

Nature *and* Science Serving Mankind

Dewey & Almy Chemical Co., Cambridge, Mass., through President Bradley Dewey has announced that increased production of canned foods in Europe is resulting in expanding sales of the company's can-sealing compounds and other products. The statement by Mr. Dewey was made before he and Hugh S. Ferguson, company executive vice president, left on a two-month trip to investigate new processes and materials and the possibility of extending operations on the Continent. Manufacturing subsidiaries of Dewey & Almy are now in operation in London and Naples, and another subsidiary near Paris will soon be producing can-sealing compounds; fluxing for soldering cans, radiators, and other products; and materials for improving the quality of concrete in construction work. In addition to these plants, the company also has manufacturing subsidiaries in Canada, Australia, and Argentina. While in Europe, Dewey and Ferguson will study conditions in France, Belgium, Holland, and England.

Continental Carbon Co. and **Witco Chemical Co.,** both of 295 Madison Ave., New York 17, N. Y., have approved immediate construction of four additional high abrasion furnace black units, which will increase fourfold Continental's output of such black. The product will duplicate the HAF Black now in production at Sunray, Tex.

Hewitt Restfoam Division, Hewitt-Robins, Inc., New York, N. Y., will show the manufacture of Restfoam cushioning to homemakers throughout the Midwest in a series of demonstrations delivered by representatives of the Hewitt Comfort Institute. The series began on April 14 at the T. S. Martin Co.'s Spring Homemakers Fair in Sioux City, Iowa., where Pitt Harris, of Restfoam's central division sales, lectured and answered questions about the household possibilities of foam rubber. Working with a mixing device simulating the actual whipping process in the manufacture of Restfoam, Harris described the preparation of latex foam and the subsequent development of the many Restfoam products. This talk and others being scheduled for spring household promotions at stores throughout the central states will demonstrate to housewives the strides taken in the field of latex foam as a household cushioning material.

Eriez Mfg. Co., Erie, Pa., has appointed Arlo Israelson chief engineer, replacing W. W. Mojden, now with Mills-Winfield Co., Eriez sales office in Chicago. Mr. Israelson comes to Eriez from the Flynn Machine Co., Inc., and he has also been associated with the Koppers Co. and a private firm of consulting engineers in Los Angeles.

A. Schrader's Son, Division of Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn 17, N. Y., has appointed D. F. Cisney advertising manager.

Wallace C. Manville has been named resale representative for Schrader's Denver, Colo., territory. Mr. Manville spent many years with United States Rubber Co. in various sales capacities. He was manager of the tire engineering and service department before he left to open his own service station and retreading shop in San Diego, Calif.

WEST

Union Asbestos Elects

At a meeting on April 12 the board of directors of Union Asbestos & Rubber Co., Chicago, Ill., elected James H. Watters as chairman of the board and Norman C. Naylor as president.

Mr. Watters, president of the company since 1941, came to Union Asbestos from Marion Steam Shovel Co., where he had been president for a number of years following his previous association with the New York Air Brake Co. as vice president.

Mr. Naylor, vice president of Union Asbestos since July, 1948, came to the company from the American Locomotive Co., where he had been vice president and is now a director. From 1943 to 1947 he was the president of the Railway Supply Manufacturers Association and is now chairman of the executive committee of the Railway Business Association.

World Transportation Fair

The story of rubber, which has made possible the development of modern high-speed transportation, will be told in all its fascinating detail at the World Transportation Fair, to be held in Los Angeles, Calif., on May 30 to September 9. The Fair has as its slogan, "If It Rolls, Floats, or Takes to the Air, You'll See It at the World Transportation Fair," and will show every type of vehicle from bicycles to jet planes, together with spectacular pageantry covering the history of transportation.

Santa Anita Park, 14 miles from the heart of Los Angeles, will be converted into an exposition city covering an area equivalent to 191 city blocks, where thousands of exhibits and lavish spectacles will graphically depict world developments in transportation from the earliest days. The Fair's theme will be carried out in a "Cavalcade of Transportation" on an outdoor stage with facilities for launching rocket planes and capable of accommodating trains, autos, buses, boats, and other forms of transportation traveling at high speeds. There will also be prizes in each class of transportation vehicle, exhibits by more than 20 foreign nations, and ample provision of facilities for entertainment and amusement.

Arrowhead Opens New Plant

Completion of the new plant, at Downey, Calif., of the Arrowhead Rubber Co., division of National Motor Bearing Co., Inc., has been revealed by L. A. Johnson, National Motor Bearing president. The new factory, necessitated by Arrowhead's rapid growth and diversification since the war, provides greatly increased floor space and additional production facilities to accommodate the company's increased production schedules. Provisions have also been made for future expansion, according to H. K. Pohlman, Arrowhead president.

The plant layout consists of three separate buildings, so located that the maximum in efficiency, cleanliness, and convenience is achieved. The compounding and milling departments, and the raw materials warehouse are in one building separate from the rest of the plant, thus keeping the main factory building and general office building free of dust and carbon black. Compounds and raw materials are withdrawn from the warehouse and compounding departments and trucked on a runway directly to the stock preparation and extrusion departments in the main factory.

This building is of modern sawtooth design, utilizing patented "tilt-up" prefabricated concrete wall construction supported by structural steel semi-rigid framework. Housed in the main factory building are the stock preparation and extrusion departments, press lines, shipping and receiving, and the Airtron duct department, as well as offices for Inspection and production control, plant supervision, engineering department, and chemical laboratory.

The Airtron duct division of Arrowhead, where the company's rubber and fabric flexible ducting is manufactured, occupies an entire separate wing of the main factory building. Duct department floor space in the new plant is approximately four times that of the previous location in Vernon, and all phases of manufacturing in this department are separate and independent of the other production departments. New equipment, improved manufacturing techniques, and streamlined materials handling methods provide greatly increased productive capacity.

A breezeway connects the attractive building which houses the company general offices with the main factory building.

As a result of exhaustive studies and planning prior to the layout of the new plant, and with the increase in floor space and the addition of new equipment, the potential productive capacity of the company will be more than tripled.

Promoted by 3M

Minnesota Mining & Mfg. Co., St. Paul, Minn., has promoted one officer and elected two new ones.

Clarence M. King, former assistant treasurer and assistant secretary, has been named treasurer and will continue also as assistant secretary.

George H. Schoettly and Edwin H. Church are new assistant treasurers.

King joined the firm in 1926 as an accountant and was later appointed auditor. He became assistant treasurer in 1939 and was also elected assistant secretary in 1948.

Schoettly first served 3M as a bookkeeper for a year, then became assistant credit manager. After five years he was made credit manager and held that position for the 20 years prior to his new promotion.

Church was controller of the Inland Rubber Corp. of Chicago before joining 3M in 1949 and was auditor of disbursements before assuming the post of assistant treasurer. Inland is a former subsidiary of Minnesota Mining.

Louis F. Weyand, vice president in charge of the Minnesota Mining & Mfg. Co.'s adhesives and coatings division, was elected to the firm's board of directors on April 11. Mr. Weyand joined 3M in 1915, subsequently held a number of sales supervisory posts, was named general manager of the adhesives division in 1945, and was elected a vice president of the firm in 1948. Headquarters of the company are in St. Paul, Minn. The adhesives plant and offices are located in Detroit, Mich.

NEWS ABOUT PEOPLE

Wm. P. Cornelius has been appointed manager of the new district office of Giffels & Vallet, Inc., and L. Rossetti, associated engineers and architects of Detroit, Mich., it was announced last month by V. E. Vallet, president of the firm. The new office is at 2121 Commerce Bldg., Houston, Tex. Colonel Cornelius returns to his native Texas from Richland, Wash., where he was chief of the construction and maintenance division of the immense Hanford Atomic Energy Project. Giffels & Vallet were the engineers engaged in the design of two of the major projects at Hanford Works. They are also engineers for the current Atomic Energy developments at Oak Ridge, Tenn., on which Colonel Cornelius was construction officer from 1943 to 1946.

W. A. Geddye has been appointed in charge of sales and service to the rubber industry by Monsanto (Canada), Ltd., Montreal, Toronto, and Vancouver. Mr. Geddye was formerly with Minner Rubber Co., Ltd., Granby, P.Q.

John H. Drexler has been transferred to the Boston, Mass., office of Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp., New York, N. Y., as a technical representative. He was formerly with the Philadelphia district office and has been with Carbide since 1940 except for service as a naval aviator in World War II.

David S. Hunter, advertising manager of A. Schraders' Son, division of Scovill Mfg. Co., Inc., Brooklyn, N. Y., has announced his resignation, effective immediately. His future plans will be announced at a later date.

J. M. Robbins has been elected vice president—manufacturing of B. F. Goodrich Rubber Co. of Canada, Ltd., it is announced in Kitchener, Ont., company headquarters, by George W. Sawin, president of the Canadian company. Mr. Robbins, who joined the B. F. Goodrich Co. in Akron in 1928, had served the Rubber company in California, Sweden, and Colombia before going to Canada in 1949 as general manager of manufacturing there. He succeeds B. M. Costello who became vice president — manufacturing of International B. F. Goodrich, a division of The B. F. Goodrich Co.

James A. Adamson, manager of the real estate department of U. S. Rubber, has retired after 21 years' service. Mr. Adamson joined the company in an engineering capacity in May, 1929.

Ward W. Killion recently resigned from Tyer Rubber Co., Andover, Mass., to set up a sales engineering office on Woodland Rd., Andover. Mr. Killion had been assistant sales manager, since April, 1948, of Tyer's sundries division, handling sales of industrial molded goods, extrusions, rubber bands, and sportswear. Prior to that he had spent 15 years with the Goodyear Tire & Rubber Co. in various technical and sales capacities in the mechanical goods division.

Edmond J. Hagan has been appointed sales representative for the press and power tool department of The Baldwin Locomotive Works, Philadelphia, Pa., working out of the New York district sales office and covering northern New Jersey, New York, and New England. Mr. Hagan, a three-year Navy veteran, spent six months in the steam turbine department of Westinghouse before going with Baldwin. A graduate of the Baldwin training program, Mr. Hagan went into the testing department and from there into field service, where he remained until his recent appointment.

Hector W. Chandler, eastern credit manager of Dunlop Tire & Rubber Goods Co., Ltd., has been elected president of the Montreal chapter of the Canadian Credit Institute.

OBITUARY

Harry L. Boyer

HARRY LLEWELLYN BOYER, vice president and general manager of the Joseph Stokes Rubber Co., Trenton, N. J., until his retirement on June 30, 1928, died in Santa Monica, Calif., on March 17. He had been associated with Stokes for 31 years.

Mr. Boyer was born in Pheonixville, Pa., December, 1874. He was educated in public schools.

Before joining Stokes in 1897 he had been employed by the New Jersey Steel & Iron Co.

Mr. Boyer was a member of Column Lodge 120, F & M Trenton Consistory Ancient Accepted Scottish Rite, 32nd degree Masons and Crescent Temple. He had also been a director of the First Mechanics National Bank, Wilbur Branch, Trenton.

Funeral services were held at St. Michael's Episcopal Church, Trenton, followed by burial at Greenwood Cemetery on March 25.

Surviving Mr. Boyer are the widow, Sarah Stokes Boyer, daughter of the late Joseph Stokes, founder of both the Joseph Stokes Rubber Co. and the Home Rubber Co.; and three nephews, H. M. and E. L. Royal, executives of H. M. Royal, Inc., and Joseph Stokes Royal, who operates his own selling agency of rubber products in Chicago, Ill.

The Boyers' only son was killed while flying in World War I.

William J. Canary

THE Eastern division manager of the Barr Rubber Co., 1 Madison Ave., New York, N. Y., William J. Canary, died at his Great Neck, L. I., home April 11. Solemn Requiem Mass was sung for the 56-year-old executive at St. Aloysius Roman Catholic Church, Great Neck, followed by burial on April 15 at Calvary Cemetery.

During the war Mr. Barr was chief of the chemical division of the War Production Board. In addition he was a member of the Advertising Club, Royal Arcanum, and Toy Knights of America.

Surviving the deceased are the widow, his mother, and two sons.

Crosby Richards

THE South African organization of Goodyear Tire & Rubber Export Co. lost its sales director with the death of Crosby Richards on March 26 at Port Elizabeth, South Africa. He succumbed to a heart attack.

Mr. Richards was born in Dickinson, N. Dak., in 1895. He was graduated from the University of North Dakota before doing post-graduate work at the University of Pennsylvania.

In April, 1925, he joined Goodyear and two years later left the United States for his first foreign assignment, in Italy. In 1930 he went to the Philippine Islands as manager of the company's sales organization and seven years later transferred to Brazil as manager of sales operations. In 1938, Mr. Crosby was appointed sales director of the Australian company and in 1949 was appointed to the position he held at the time of his death.

Funeral services for the deceased, who is survived by his widow and two sons, were held in Port Elizabeth.

Kennedy Hassenzahl

KENNEDY HASSENZAHL, rubber dealer and importer with Farr & Co., 120 Wall St., New York, N. Y., since February 19, 1935, died March 19 in a New York hospital from a heart attack. Funeral services were held March 21 at Universal Chapel, New York, and Wm. Voss Chapel, Seymour, Ind., on March 22, followed by interment in Reddington, Ind., where the deceased was born on February 20, 1891.

Mr. Hassenzahl, a graduate of Purdue University in 1915, saw active service during both World Wars as an officer, and before returning home from World War II in 1945 he completed a survey in Indo-China for the Rubber Control Administration.

Mr. Hassenzahl was an honorary general in the Chinese Army and a member of the Westport (Conn.) Board of Finance, the Akron, O., Chapter, Masonic Lodge, and the Republican Party.

The deceased is survived by his wife, his mother, a daughter, and a sister.

Synthetic Fibers

(*Continued from page* 195)

low initial modulus and higher cost have prevented full capitalization of its potential strength in some applications. Saponified acetate yarn has very high strength and low elongation, but its use is limited by low fatigue resistance and high cost.

Dr. Owen noted that high-tenacity viscose rayon is being used widely in all types of pneumatic tires, industrial and automotive V-belts, flat transmission belts, garden and industrial hose, diaphragms, and to a limited extent in conveyer belts. Nylon is finding increasingly greater acceptance in tires, various types of belts, diaphragms, and other applications in-

volving critical service or shock loading. The use of saponified acetate yarn is limited to a few applications where high strength or low elongation is essential regardless of yarn cost, or where flexing is no problem.

Mr. McCormack's talk presented evidence to show that blisters occurring in covered rolls and in tank linings are caused by osmotic pressure resulting from the presence of a small amount of water-soluble contaminant trapped between the plies of the roll or tank lining.

The Group will hold its annual summer outing on June 16 at the United Shoe Country Club, Beverly, Mass.

Akron Group Elects

THE spring dinner-meeting of the Akron Rubber Group took place on March 31 at the Mayflower Hotel. Feature of the meeting was a talk on "The Influence of Communism in Central Europe" by Rev. George G. Berzinec, associate professor of Russian at Kent State University and a member of the Greek Catholic Church. Although born in this country, Father Berzinec spent 18 years in eastern Europe prior to the war and served with the O.S.S. during the war. The speaker gave an extremely forceful talk on communism in Europe and took a serious view of the present state of Soviet-American relations.

In the business session preceding the talk, it was announced that E. L. Stangor, E. I. du Pont de Nemours & Co., Inc., had been elected chairman of the Group for the 1950-1951 season. Other officers elected were: vice chairman, Dale F. Behney, Goodyear Tire & Rubber Co.; secretary, Lawrence M. Baker, General Tire & Rubber Co.; and treasurer, Robert Juve, Mohawk Rubber Co. Mr. Baker, who is chairman of the membership committee, announced that the Group now has a dues-paying membership of 863, making it the largest in the country on the date of the report.

The meeting concluded with a showing of a film, "The Flying Fishermen," furnished by Eastern Airlines, and a drawing for door prizes won by H. C. Bullock, B. F. Goodrich Co., and R. A. Hagberg, West Virginia Pulp & Paper Co.

The Group will hold its annual outing on June 16 at the Firestone Country Club, near Akron. Charles Wimmer, Phillips Petroleum Co., will be general chairman in charge of arrangements for the outing.

Course in Statistical Quality Control

AN INTENSIVE course in quality control by statistical methods will be offered by the University of Colorado, Boulder, Colo., during the period from August 14 to 25. Open to production and management personnel from all over the country, the course will be given by outstanding authorities from other universities and from industry, in addition to local faculty members. The course will be limited to 60 participants who may live in University housing, although regular accommodations are also available in the city of Boulder. The fee for the 10-day course is $100, which includes instruction and all texts and materials. Further information, including reservations, may be obtained from Dean C. L. Eckel, College of Engineering, University of Colorado.

FINANCIAL

American Cyanamid Co., New York, N. Y. First Quarter, 1950: consolidated net earnings, $9,306,722, equal to $3.03 a common share, contrasted with $4,131,109, or $1.51 a share, in the initial quarter last year; net sales, $72,202,644, against $58,781,559.

Borg-Warner Corp., Chicago, Ill., and subsidiaries. Year ended December 31, 1949: net income, $22,046,885, equal to $9.16 each on 2,336,745 common shares, compared with $26.214,993, or $12.43 a share, the year before; net sales, $252,366,419, against $309,253,840; income taxes, $13,600,000, against $21,450,000.

Canadian General Electric Co., Ltd., Toronto, Ont. For 1949: net income, $4,506,375 (Canadian currency), equal to $23.36 a common share, against $5,300,079, or $27.49 a share, the year before.

Collyer Insulated Wire Co., Pawtucket, R. I. For 1949: net loss, $24,285, contrasted with net profit of $254,179, or $1.69 a share, in 1948.

Diamond Alkali Co., Cleveland, O. Year ended December 31, 1949: net earnings, $3,042,298, equal to $2.80 each on 1,086,434 common shares, contrasted with $5,280,632, or $4.86 a share, in the preceding year; sales, $48,430,652, against $51,230,184.

First quarter, 1950: net earnings, $1,055,609, on 97¢ a share, against $806,008, or 74¢ a share, in the corresponding period last year; sales, $12,700,000, against $12,480,000.

Dow Chemical Co., Midland, Mich., and subsidiaries. Nine months ended February 28: net profit, $22,681,425, equal to $4 each on 5,242,804 common shares, in comparison with $21,393,730, or $3.81 each on 5,124,274 shares, a year earlier; net sales, $154,721,323, against $149,665,659.

Eagle-Picher Co., Cincinnati, O., and domestic subsidiaries. Quarter ended February 28, 1950: net profit, $131,370, equal to 15¢ each on 889,076 common shares, compared with $1,551,388, or $1.74 a share, in the 1949 period; sales, $12,433,000, against $19,543,211.

Flintkote Co., New York, N. Y., and subsidiaries. Twelve weeks ended March 25, 1950: net income, $961,929, equal to 70¢ each on 1,260,435 common shares, contrasted with $725,871, or 51¢ each on 1,257,935 shares, in the 1949 period; net sales, $14,090,305, against $12,837,288; income taxes, $706,624, against $523,552.

General Electric Co., Schenectady, N. Y. First three months, 1950: consolidated net profit, $36,858,000 (highest in the company's history), equal to $1.28 a common share, against $26,703,000, or 93¢ a share, in the corresponding period last year; consolidated net sales, $418,450,000, against $411,615,528.

Koppers Co., Inc., Pittsburgh, Pa. March quarter: net income, $1,794,554, equal to $1.02 each on 1,617,125 common shares, contrasted with $1,813,131, or $1.09 each on 1,525,825 shares, in the corresponding period last year; net sales, $43,969,951, against $49,126,142.

Monsanto Chemical Co., St. Louis, Mo. Quarter ended March 31: net income, $5,847,557, equal to $1.26 each on 4,372,209 common shares, compared with $4,461,608, or 97¢ each on 4,274,965 shares in the 1949 period; sales, $49,183,957, against $40,893,943.

Rohm & Haas Co., Philadelphia, Pa. Year ended December 31, 1949: net income, $5,115,877, equal to $6.09 each on 799,849 common shares, contrasted with $4,289,922, or $5.25 each on 769,229 shares, in the preceding 12 months; gross sales, $62,422,792, against $62,419,158; income taxes, $3,139,000, against $3,130,000.

Quarter to March 31: net profit, $1,712,000, equal to $2.06 a common share, compared with $902,070, or $1.05 a share, in the same period last year; net sales, $18,143,000 against $14,506,000.

St. Joseph Lead Co., New York, N. Y. Year ended December 31, 1949: consolidated net earnings, $8.564,436, equal to $4.34 a share, against $9,636,737, or $4.88 a share, in 1948; net sales, $82,724,099, against $80,210,503.

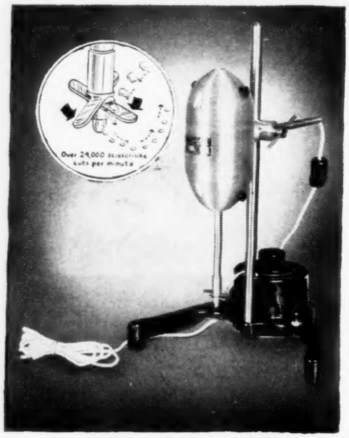
Timken Roller Bearing Co., Canton, O. First quarter, 1950; net profit, $3,059,563, equal to $1.26 a share, contrasted with $2,945,137, or $1.22 a share, a year earlier.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Baldwin Rubber Co.	Com.	$0.20 extra	Apr. 24	Apr. 14
	Com.	0.15 q.	Apr. 24	Apr. 14
Brown Rubber Co.	Stock	*	May 15	Apr. 15
Crown Cork & Seal Co., Inc.	Com.	0.25	May 19	Apr. 11
Dayton Rubber Co.	Com.	0.15	Apr. 25	Apr. 10
	"A"	0.50	Apr. 25	Apr. 10
Detroit Gasket & Mfg. Co.	Com.	0.25 incr.	Apr. 25	Apr. 10
DeVilbiss Co.	Com.	0.12½	Apr. 20	Apr. 10
Firestone Tire & Rubber Co.	Pfd.	1.12½ q.	June 1	May 15
Goodyear Tire & Rubber Co.	Com.	1.00 q.	June 15	May 15
	Pfd.	1.25 q.	June 15	May 15
Hewitt-Robins, Inc.	Com.	0.25 q.	Apr. 15	Apr. 5
Lea Fabrics, Inc.	Com.	0.37½	May 25	May 10
Mansfield Tire & Rubber Co.	Com.	0.10	Mar. 20	Mar. 10
	$1.20 Cv. Pfd.	0.30 q.	Apr. 1	Mar. 15
Midwest Rubber Reclaiming Co.	4½% Pfd.	0.56¼ q.	July 1	June 12
	Com.	0.25 q.	May 1	Apr. 14
Minnesota Mining & Mfg. Co.	Com.	0.70	June 12	May 22
	Pfd.	1.00 q.	June 12	May 22
Union Asbestos & Rubber Co.	Com.	0.25 q.	July 1	June 10
United States Rubber Co.	Com.	0.75	June 10	May 15
	8% Pfd.	2.00	June 10	May 15
S. S. White Dental Mfg. Co.	Com.	0.37½ q.	May 15	Apr. 24
		5%	May 15	Apr. 24

* One share for each two shares held.

New Machines and Appliances



Brookfield Counter-Rotating Mixer

Laboratory Mixer

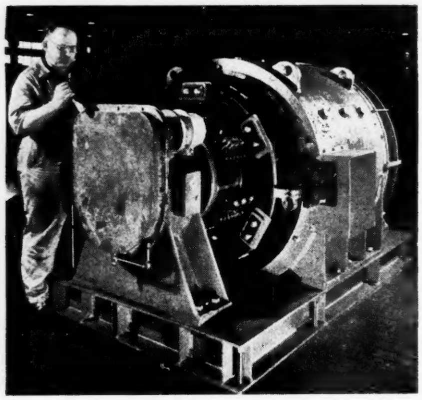
THE Brookfield counter-rotating mixer, available in the laboratory mixing speeds and results hitherto available only in large production equipment, is being marketed by Brookfield Engineering Laboratories, Stoughton, Mass. By using two motors driving two concentric oppositely rotating shafts, propeller equipped, the mixer produces an annular rather than circular flow. Thus all materials, including the heavier particles, are rapidly drawn into the propellers where they must pass through the shearing zone. There is practically no cavitation, no centrifugal effect, and the liquid level remains essentially constant, allowing the use of nearly filled containers.

The mixer allows relative speeds from approximately 200 to 12,000 r.p.m. and provides a continuously variable speed control. The motors are completely enclosed, and all immersible parts are of stainless steel, except for a bottom guide bearing of leaded bronze. Ball bearings provide trouble-free service, and a smooth acting clamp allows quick and easy position adjustments.

This mixer is available for either 110- or 220-volt currents, AC or DC, and with shaft lengths and propeller designs as required.

Calender Drive Motor

A 600-H.P., 300-450 r.p.m. calender drive motor, believed to be the largest of its kind built to date, has been shipped by Allis-Chalmers Mfg. Co., Milwaukee, Wis., to a Midwest manufacturer, where it will be used to produce tire ply fabric. With its supporting motor-generator set, this motor is part of an integrated electrical drive for the calender and its auxiliary



Allis-Chalmers' 600-H.P. Calendar Drive Motor

equipment. It is designed so that emergency calender roll stops can be made within the guaranteed limit of 14 inches of roll travel from the full load speed of 450 r.p.m., corresponding to 100 yards a minute of the calender roll.

The motor, which will drive the calender at speeds of 8-100 yards a minute, is equipped with a bearing temperature relay, geared tachometer, and speed limiting device. The supporting motor-generator set consists of a 500-k.w., 600-volt D.C. generator driven by a 2,300-volt, 900-r.p.m. motor. This set is also equipped with bearing temperature relays and speed limiting device.

Mechanical Goods Press

A NEW type of mechanical goods press, Model 110, designed primarily for light-duty operations such as the production of sponge and blown goods, has been developed by McNeil Machine & Engineering Co., 96 E. Crosier St., Akron 11, O. The press exerts a total pressure of 110,000 pounds over a platen area 32 by 48 inches, and the 32-inch platen depth facilitates efficient loading and unloading operations. Two adjusting screws are provided to assure uniform platen pressure throughout the 48-inch length.

The press is equipped with adjustable shear action so that during the opening cycle the top half of the mold follows an angular path, stripping the finished products from the cavities. The machine cycle is controlled by an automatic timer that governs the curing period, cooling period, and automatic opening of the press. The press is operated by a high torque electric motor and does not require any hydraulic mechanism.

McNeil Model 110 Light Duty Press for Sponge and Blown Goods

EUROPE

GREAT BRITAIN

Electrodecantation of Latex

Jatex, the 60% concentrated Dunlop latex marketed by Wm. Symington & Son, Ltd., has hitherto been produced by centrifugation. According to a notice in a booklet issued by the firm, work is under way to concentrate Jatex by electrodecantation.

Attention in England was drawn to the method of electrodecantation by a paper read by E. A. Murphy before the Institution of the Rubber Industry in 1942.[1] The method was based on phenomena observed by Pauli and his coworkers in Austria during experiments with electrodialysis as a means of purifying latex. These investigators found that when aqueous dispersions of rubber were subjected to dialysis between vertical semipermeable membranes, separation frequently occurred so that super-imposed layers of different concentrations were obtained. By suitably controlling the current these layers, which at first were in vertical strata, formed horizontal layers, with the more concentrated layers uppermost. It was found that this stratification was controllable within certain limits, and, furthermore, that by adjustment of the electrical potential and by periodical reversal of the current, deposition on the membrane around the anode (with consequently relatively considerable losses of rubber) could be prevented.

Apparatus was designed permitting continuous concentration by separation and continuous draining off of the concentrated latex at the top of the device and the serum at the bottom. It soon developed that the rate of separation could be increased by increasing the number of diaphragms in a separating compartment, and as many as 200 such diaphragms have been placed in one unit.

In production units the total volume of latex in the separating compartment at any time may be 100 gallons, but larger units are apparently being developed.

Compared with other methods of concentration, the new process has the advantage that loss of rubber in the serum rarely exceeds 1%; whereas in centrifugation the loss may be as high as 7%. As against creaming, electrodecantation has the advantage of containing no creaming agents; while the concentrate obtained by this process has greater stability on prolonged storing than creamed latices, resembling in this respect centrifuged latex.

[1] "Electrodecantation of Latex." *Rubber Age (London)*, Feb., 1950, p. 449.

Increased Facilities for Dunlopillo Manufacture

The demand for latex foam cushioning has been growing to such an extent that the Dunlop Rubber Co., Ltd., has found it necessary repeatedly to extend production facilities. Not long ago the company bought the Bintex works at Harrogate for this purpose; now it has extended the Dunlopillo factory near Liverpool by the purchase of the adjacent works of Reckett & Colman, Ltd. But though this latest acquisition will provide additional 40,000 square feet, the company is reported to be planning also to set up a manufacturing unit for latex foam at Fort Dunlop.

The British Rubber Development Board plans a campaign to increase the use of latex foam in Great Britain along lines similar to those used for the same purpose in the United States during the last three years. As a first step a Latex Foam Advisory Committee has been set up, and interested manufacturers have been requested to make suggestions.

Notes on the British Rubber Industry

The value of the chief exports of rubber goods from Great Britain during 1949 showed an increase as compared with that of 1948, entirely owing to the rise in tire exports. The foreign sales of tires advanced from £9,911,622 in 1948 to £12,499,107 in 1949. But the value of exports of tubes declined from £1,200,207 in 1948 to £1,177,201 in 1949, and of other rubber products, from £6,351,370 to £6,055,604. There had been an upward trend in exports of the latter goods in October and November, 1949, but this was not maintained in the final month of the year.

The twenty-ninth British Industries Fair will be held May 8 to 19, simultaneously at Olympia and Earls' Court, London, and at Castle Bromwich, Birmingham.

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FIRST IN SILICONES

The Edinburgh Corp. Education Committee is offering a three-month course in elementary rubber technology, open to all. D. W. Hinton, of the North British Rubber Co., Ltd., Edinburgh, had been appointed lecturer. The course, while complete in itself, will serve as introduction to the more comprehensive practical course which it is intended to launch later.

The Ministry of Education has announced that about 50 more post-graduate awards for the study of technology are to be made available in 1950-51 at selected universities and technological institutions in the United States. The cost of the awards is met from funds provided by the ECA. The aim of the scheme is to produce a small group of well-qualified men who will return to industrial posts or universities and technical colleges in Britain. The first awards under this scheme were made last year.

The British Tire & Rubber Co. has bought and equipped an up-to-date research laboratory at its Burton-on-Trent factory for the B.T.R.-Silvertown Group. R. J. Tudor, who has done important research and development work at the Silvertown factory, and won the I.R.I. President's Prize in 1943 for his paper on synthetic rubber processing, will be in charge of the new laboratories.

Monsanto Chemicals, Ltd., which opened the Nickell laboratories at Ruabon in May, 1949, is to convert newly acquired Fulmer Hall, at Fulmer, Buckinghamshire, into a second research center.

Pirelli General Cable Works Co., London, is reported to have constructed a machine for sheathing cable in aluminum on a commercial scale. It seems that any type of cable can be handled.

Redfern's Rubber Works, Ltd., Hyde, Cheshire, manufacturer of rubber specialties including hard and soft rubber household and mechanical goods, and soles and heels, is celebrating its fiftieth anniversary. To mark the occasion the firm has sent out an attractive folder in which the progress of the company is now cleverly connected with important historical events, now amusingly illustrated by reminders of a bygone day. The undertaking, started by young Wilfred E. Redfern in 1850 with a capital of a little over £4, grew and new products and new factory space were gradually added until today the company can proudly claim a place in the front ranks of British rubber manufacturers.

FRANCE

Behavior of Rubber at Low Temperatures

Studies on the effect of sulfur and plasticizers on the cold-resistance of vulcanizates were carried out by P. Durou[1] at the laboratories of the Institut Français du Caoutchouc with the aid of apparatus designed by Lainé and Roux, of the Station Experimentale du Froid (Station for Low Temperature Experimentation). Mr. Durou found that where rubber is to be used at a temperature not lower than —30° C., with little change in properties, the proportion of sulfur should be 2.5%: slightly less, that is between 2% and 2.5%, is required if a compound is to retain optimum properties under the widest temperature range. If a rubber must be constantly kept at very low temperatures (—45, —65° C.), best results are obtained with small doses of sulfur, although, of course, these rubbers will have but mediocre properties at ordinary temperatures.

Next, the effect of certain plasticizers, including adipate, phthalate, butyl sebacate, on natural rubber, and for the sake of comparison, also on Neoprene F.R., at low temperatures was studied. It developed that plasticizers bring about a more marked improvement in Neoprene F.R. than in natural rubber; thus when 20-volume parts of butyl adipate were added to neoprene, the temperature of rigidity was lowered from —31 to —53° C., while in the case of natural rubber the point of rigidity was only lowered from —56 to —63° C. As the writer points out, the plasticizers employed have been especially designed for synthetic rubbers, and it is possible that other products might be more effective in natural rubber. He concludes his studies by stressing the value of the apparatus used in the tests—it is simple, easy to manipulate, and serves many purposes in the investigation of low-temperature problems.

[1] *Rev. gén. caoutchouc*, 27, 1 31 (1950).

Rubber in Dwellings

In collaboration with the Institut Français du Caoutchouc, the Association Française des Ingenieurs arranged last October a

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one-day conference on rubber in the dwelling. In 11 papers the various applications of rubber in the construction of dwellings, in increasing comfort and improving hygiene in the home, and even in beautifying it, were presented. The papers follow:

"The Use of Rubber in Building," by M. Barthe, architect; "Articles of 'Bulgomme'," M. Pennel, of Etablissements Pennel & Flipo; "Rubber Floor Coverings," M. Fargeas, Societe Electro-Cable; "Cemetex," M. Texier, S. A. des Pneumatiques Dunlop; "Conductive Rubber for Heating Walls," M. Turlin, Societe Apel; "Rubber Electrical Insulations," M. Nico, vice president, Syndicat du Caoutchouc; "Foam Rubber," M. Loeffler, Societe Franco-Belge du Caoutchouc-Mousse; "Various Uses of Rubber in the Dwelling," M. Godefroy, director of the Applications Center of Institut Francais du Caoutchouc; "Rubber-Based Paints," M. Popham, British Rubber Producers' Research Association; "Watertight Roofs," M. Varlan, general secretary, Association Internationale de l'Asphalte; "Rubber Articles in Vacuum Cleaners, Waxers, Refrigerators," M. Hublin, director, Center of Research, Institut Francais du Caoutchouc.

French Industry Notes

The ECA has approved the plan of Le Blan Cie., one of the chief manufacturers of cotton cord for automobile tires, to install modern equipment in the company's plant at Lille. Cost of the undertaking will be about $1,382,000, including $1,042,000 in ECA assistance funds. The new equipment should make possible higher quality and lower costs; it should also free enough workers to operate about 25,000 spindles now idle because of the shortage of labor. Furthermore an annual increase of 1,200 tons in the output of tire cord is expected, enough, it is pointed out, for 600,000 tires.

Societe H.F.T. was formed last October to manufacture high-frequency machines for welding plastic materials and is under management of Leon Andouart and Andre Berjonneau. The firm's factory is located at Saint Brieuc-sous-Foret (Seine et Oise).

GERMANY

Attention has been called[1] to the increasing quantities of dipped rubber goods that, made in the Russian Zone, are being illegally traded in the Western Zone at prices that would hardly cover the cost to produce them in Western Germany. The chief articles dumped in this way seem to be prophylactic rubber goods and surgeons' gloves. The latter have been offered to wholesalers for as little as 60 German marks for a hundred pairs.

The writer holds the partition of Germany to be partly responsible for this situation; he points out that the separation of Germany into zones causes overlapping and duplication of productive and trade efforts in various industries which, as in the the case of dipped goods, may have unfortunate results.

With regard to dipped rubber goods, he reminds his readers

[1] *Kautschuk u. Gummi*, Jan., 1950, p. 11.

that their manufacture was formerly almost exclusively a specialty of what is now the Russian Zone; now production of these goods has also been taken up in the Western Zone on a scale sufficient to satisfy all local needs. This situation has led to ever sharper competition between the two sectors in this field so that in the Eastern Zone we find that though factories have been dismantled, productive capacity is still too high for current demand and some factories have had to close down from time to time. In the Western Zone, it is stated, there have been cases where production of dipped goods had to be abandoned; in other instances, new installations could not be put into operation.

For a time competition, though keen, was above-board. But lately, says the writer we are quoting, unscrupulous elements, for the most part newcomers in the business, have entered the trade and have taken advantage of the difference in the values of East and West marks to dump Eastern Zone goods in the West at ruinous prices.

At the Farbenfabrik Wolfen, Wolfen, in the Eastern Zone, an installation for the manufacture of rubber accelerators recently began operations. It is expected that the Wolfen plant will produce enough accelerators to fill all of the needs that arise in the Soviet Zone.

On December 6, 1949, Veritas Gummiwerke A. G., Gelnhausen, celebrated its one-hundredth birthday. The firm, which specializes in mechanical and surgical rubber goods, was founded in 1849 in Berlin, by an Englishman, William Elliot. He sold the business two years later, and the concern passed through several hands during the next 20 years. But after it was converted into a joint stock company in 1871, luck changed. Its real development, however, seems to have started after the fusion in 1886 with the Frankfurter Gummiwaren Fabrik Wendt, Buchholz & Co., Gelnhausen. The combine adopted the name Vereinigte Berlin-Frankfurter Gummiwaren-Fabriken, A.G., establishing headquarters in Berlin, and under this name it was widely known until 1929, when it was again reorganized, as Veritas Gummiwerke A.G. During the war the works in Berlin were seriously damaged, but the factory in Gelnhausen was able to carry on. Since 1947 main offices have been at Gelnhausen. The factory in Berlin is being reconstructed.

Rubber Powder Developments

(Continued from page 177)

likely to extend the use of natural rubber are shared by the three national units involved, and this principle will apply to the use of the Mealorub process, developed by the Indonesian Research Institute at Buitenzorg, Java.

Latest reports indicate that the Board of Indonesian Rubber Research Institute has agreed to grant licenses to suitable applicants in rubber producing countries to produce Mealorub powder, and that it plans to institute a system of testing the product manufactured under license to insure that quality is kept up to standard.

The Rubber Research Institute of Malaya has already been independently investigating other methods of manufacturing rubber powder and has apparently succeeeded in making a powder from skim latex, hitherto known only as the rather troublesome waste product of the manufacture of concentrated latex.

It is reported also that a plant with a capacity of 50 tons of rubber powder monthly and a potential several times larger is being built at Singapore and will commence operating shortly. But it is not clear whether Mealorub or the R.R.I. product will be manufactured at this factory.

The Indonesian Rubber Research Institute informs us that the rubber powder used in the road experiments in Malaya, reported in our December, 1949, issue, was Mealorub, which it supplied; the Institute adds that it recommends the addition of 5% of the powder to the asphalt-bitumen mixtures for road surfaces.

Editor's Book Table

BOOK REVIEWS

"A Chemistry of Plastics and High Polymers." Patrick D. Ritchie. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 5½ by 8½ inches, 296 pages. Price, $4.50.

This book is a departure from the usual text on high polymers in that it emphasizes the organic chemistry of polymeric materials rather than the theoretical approach to the subject. As such, it fulfills a definite need of a one-volume book giving a comprehensive treatment of polymer chemistry from the synthetic and structural aspects. The physical chemistry is discussed in a qualitative and non-mathematical manner, and other fundamentals are given brief but adequate treatment. Although requiring a knowledge of chemistry at about the graduate level, this book gives a highly satisfactory survey of polymer chemistry and shows the breadth of the field, summarizes raw material sources and synthetic methods, and surveys recent advances.

The presentation is well written, systematic in outline, and illustrated with many structural diagrams. The 16 chapters cover the following subjects: plastics and high polymers; polyfunctional molecules and polymerization; mechanism and kinetics of polymerization; synthetic addition high polymers; polyesters, polyamides, and polyethers; phenoplastics; aminoplastics; natural high polymers, including proteins, cellulosics, lignins, and rubbers; drying oils; mineral and inorganic high polymers; relation between structure and polymer properties; and high polymers and plastics. A list of references for further reading is appended to each chapter, and the book concludes with an index of trade names and author and subject indices.

"Industrial Chemistry." Fifth Edition. E. Raymond Riegel. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. Cloth, 6 by 9 inches, 1,028 pages. Price, $7.

This new edition retains the style and organization of preceding volumes, but shows the addition of much new material and revision of out-dated and superseded discussions. Intended for the student and general reader, the book is an elementary treatise emphasizing the interrelation of the different branches of industrial chemistry. For each chemical or class of materials, there are discussions of trends in production levels and costs, outlines of the raw materials, equipment, and processes used in manufacturing, and descriptions of the major applications for each product.

The whole range of industrial chemistry is covered, including inorganics and metals, organics and polymers, machinery, and patents. Many diagrams and photographs illustrate the text, and each of the 50 chapters concludes with a bibliography of further reading references and a list of problems. Included is a chapter on rubber, both synthetic and natural, and a chapter on synthetic resins and plastics. An appendix of conversion and other tables also appears, together with a comprehensive subject index.

"Les Derives Chimiques du Caoutchouc Naturel." J. le Bras and A. Delalande. Dunod, 92 Rue de de Bonaparte (VI) Paris, France, 1950. Paper, 5¼ by 8½ inches, 509 pages. Illustrated. Price, 1,880 francs.

In planning the present work the authors had to decide whether to consider in detail only such chemical derivatives of natural rubber as have been developed on a commercial scale, or whether to mention every one of the derivatives so as to emphasize their number and possibilities. The second alternative was adopted; and the authors have included all chemically modified rubber products except rubber vulcanized with sulfur.

Since the work is expected to reach a wide circle of technologists outside the rubber field, the book opens with a brief history of the rubber growing industry and a discussion of the properties and composition of natural rubber. The succeeding six chapters treat, respectively: halogenated derivatives; halohydrogenated derivatives; hydrogenated rubbers and products of decomposition of rubber and of hydrogenated rubber; oxidized derivatives; cyclized rubbers; and various derivatives and modified rubbers. Each chapter presents the history of the product involved, methods of production, properties, and actual and possible uses, and ends with a list of references. Addresses of companies in France, England, and the United States manufacturing chemical derivatives of rubber, and an index complete the book.

The authors point out that the possibilities of certain derivatives of rubber have not yet been exhaustively investigated,

and it is suggested that products with useful, still unsuspected properties might perhaps be obtained, for instance, by the extension of the application of the Friedel-Crafts reaction to various aromatic compounds. Furthermore much work must be done on fluorinated derivatives and compounds derived by combination of rubber with unsaturated products.

This tendency of the writers to point up such possibilities is seen throughout the book, and together with the large amount of solid information offered and clearly and interestingly presented, makes the work a valuable and stimulating addition to the library of chemists and manufacturers in the plastics as well as in the rubber industry.

NEW PUBLICATIONS

"Convert to Comfort with Latex Foam." Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D. C. 18 pages. This illustrated booklet describes the advantages of latex foam cushioning, discusses the various types of foam units available for upholstering, and gives step-by-step instructions on how to reupholster furniture with latex foam. A brief description of the foam manufacturing process is also given, together with a list of foam manufacturers and their trade names.

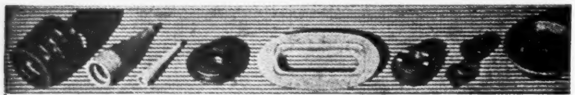
Publications of Indoil Chemical Co., 190 S. Michigan Ave., Chicago 80, Ill. **"Indonex Plasticizers as Crystallization Retarders in Neoprene Compounds."** Circular No. 13-38, March 1, 1950. 8 pages. Test formulations and data show that Indonex 634½ is effective in retarding the crystallization of both uncured and cured Neoprene GRM and RT stocks. **"Indonex Plasticizers in Low Cost Butyl Compounds."** Circular No. 13-39, March 15, 1950. 6 pages. Indonex 638½ is shown to be an effective plasticizer of Butyl mechanical goods compounds both with and without ground scrap and Butyl reclaim. Test results indicate these compounds to be suitable for various automotive and other applications.

"The Chemistry of Guanidine." Cyanamid's Nitrogen Chemicals Digest, Vol. IV. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. 52 pages. Detailed technical information appears on the chemical and physical properties, synthesis, chemical reactions, methods of analysis, toxicity, and potential applications of guanidine. The section on applications describes the use of guanidine as an antioxidant for rubber and as a stabilizer for vinyl resins.

"Barrett Rubber Softeners in Nitrile Rubber Compounding." Rubber Laboratory Release No. 13, February, 1950. Barrett Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y. 30 pages. Extensive laboratory test data, including graphs and tables, are presented on the use of dibutyl phthalate and Cumar resins P-25, RH, and MH-2½ in Butaprene NXM, Chemigum N-3, Hycar OR-15, and Paracril 18. The Cumar resins are shown to give improved processing; while dibutyl phthalate is shown to be particularly effective in obtaining low hardness, high resilience, and low compression set.

"A.S.T.M. Standards on Adhesives." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Paper, 6 by 9 inches, 64 pages. Price, $1.25. This compilation includes all 15 A.S.T.M. standards relating to adhesives. The standards cover sampling, adhesive tests, bond strength tests, and definitions of terms relating to adhesives. Three standards on rubber adhesives are included: tests for cement viscosity and total solids content; sampling and testing rubber latices; and tests for rubber adhesives.

"Statex K, The Best Tread Carbon for All Rubbers." Columbian Carbon Co., 41 E. 42nd St., New York 17, N. Y. 30 pages. This bulletin summarizes the company's investigations of Statex K as a reinforcing agent for "cold rubber" and shows the significance of the carbon gel concept of reinforcement mechanism. Extensive data in the form of tables and diagrams show that hot milling of Statex K-"cold rubber" treads improves road wear, and that a Statex K-Statex B blend properly milled into "cold rubber" gives tread wear practically equal to that with straight Statex K. Preliminary work on the hot milling of Statex K into natural rubber tread compounds is indicated to give similar improvement in tread wear.



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Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	Feb. 25	Mar. 25	Apr. 1	Apr. 8	Apr. 15	Apr. 22
June	18.85	19.37	20.22	22.50	22.20	23.70
Aug.	18.63	18.82	19.50	20.95	21.02	22.80
Oct.	18.40	18.56	19.11	20.00	20.19	22.21
Dec.	18.10	18.30	18.75	19.20	19.55	21.35
Feb.	18.00	18.20	18.65	19.10	19.45	21.75
Apr.	17.90	18.10	18.55	19.00	19.35	21.65
Total weekly sales, tons	3,000	2,240	4,110	5,310	5,290	8,090

ADVANCING prices reaching new life-of-contract highs featured rubber futures trading on the Commodity Exchange during April. Short covering and speculative activity were in great evidence as prices rose irregularly to reach new postwar highs. Major reasons for the advance were: (1) heavy buying on the London and Singapore markets as speculative interests endeavored to cover their committments; (2) continued failure of the recent Indonesian currency and export reforms to release stocks of crude rubber estimated at 60,000 tons; (3) political unrest in Malaya, with consequent reduction of rubber exports; (4) active stockpile purchasing by the United States and other governments; (5) a general worldwide demand for rubber; and (6) renewed purchasing by domestic consumers who anticipate a strong demand for replacement tires.

The rising market brought uncertainty and some differences of opinion as to the probable duration of the natural rubber tight position. It was pointed out that the substantial premium of natural rubber over GR-S has already resulted in an increase in consumption of the latter, with a further increase certain. The high natural rubber prices must also result in a general downward trend in world demand. This factor coupled with a sudden loosening of Indonesian hoarded stocks could saturate the market at almost any time. In addition, manufacturers believe that the speculative bubble in Singapore must burst soon, with a resultant break in the market. In view of all these factors, a market decline in the very near future would not come as a surprise, but the general belief is that the demand for natural rubber will continue at a sufficiently high level as to assure a tight statistical position for at least the balance of this year.

June futures began the month at a low of 20.45¢, spurted the permissible limit of 2¢ a pound on April 5 to reach 23.40¢, fluctuated between 22.20¢ and 23.40¢ until April 20, rose to a high of 24.95¢ on April 24, and then fell off to end the month at 24.55¢. Other futures prices showed corresponding movement to register new postwar highs. The increased market activity was evident in the total volume of 24,250 tons sold during April, as compared with March's total of 13,670 tons.

New York Outside Market

THE factors influencing the futures market had a corresponding effect on the New York Outside Market last month, with prices rising to new postwar highs. Factory purchasing was heavier than in recent months, but continued sporadic as consumers endeavored to confine their purchasing to the downward side. The market exhibited great elasticity, however, and these purchases served only to halt declines and initiate further advances. Government purchasing for the stockpile was also very much in evidence, although centering primarily in the July-September period.

The spot prices for No. 1 sheets started the month at the low of 21.50¢, rose abruptly on April 5 to 24.50¢, then fell off slightly and fluctuated irregularly during the next two weeks. On April 24 the price again rose sharply to a record high of 26.00¢, the highest spot price in more than 11 years, then fell off in the face of profit taking and renewed buyer resistance to end the month at 24.25¢. No. 3 sheet prices also showed a strong advance, moving from a low of 20.50¢ on April 3 to a high of 24.50¢ on April 24, and closing the month at 23.75¢. With demand centered in premium grades for spot and nearby delivery, No. 2 Brown and Flat Bark prices showed less marked advances. No. 2 Brown rose from a low of 20.00¢ on April 3 to a high of 22.50¢ on April 24, and closed at 22.00¢ on April 28. Flat Bark rose sluggishly from 18.50¢ on April 3 to 19.25¢ on April 6, fell back to a low of 18.25¢ on April 13, then rose to the high of 20.50¢ on April 24, and ended the month at 20.00¢

WEEK-END CLOSING PRICES

	Feb. 25	Mar. 25	Apr. 1	Apr. 8	Apr. 15	Apr. 22
No. 1 R.S.S.:						
Spot	19.25	19.88	20.75	23.50	23.00	24.00
May	19.25	19.75	20.63	23.25	22.63	23.88
June	19.25	19.50	20.25	23.00	22.38	23.63
July-Sept.	18.88	18.88	19.75	21.38	21.25	22.75
No. 3 R.S.S.	19.00	19.38	20.00	21.75	21.50	22.50
No. 2 Brown	19.13	19.13	19.75	20.75	20.38	20.75
Flat Bark	18.00	18.25	18.50	19.25	18.50	19.00

Latices

DOMESTIC supplies of *Hevea* latex during the first half of 1950 will be insufficient to meet all demands, according to Arthur Nolan, Latex Distributors, Inc. New concentrating factories entering into production will increase supplies, but are not expected to meet the demand for latex. It is thought that pressure on increased supplies will not lift this year and will have a restrictive effect on plants initiating or expanding foam production facilities. Relief will come from present latex producers and importers expanding their production and collection facilities, but such a task requires time. Some relief will also come from increased usage of GR-S latex in view of the price incentive, the promise being shown by new polymers, and the reduction of the odor problem.

With the advance in crude rubber prices, *Hevea* latex prices also rose during April. Early in the month *Hevea* latex sold at 27.5-29.5¢ a pound and rose again following the trend of the crude rubber markets.

Domestic consumption of *Hevea* latex continues to increase with 3,857 long tons, dry weight, used in January and estimates of 3,992 long tons in February, despite the latter being a short month. Imports were 3,974 long tons, dry weight, in January and are estimated at 3,336 long tons in February. Stocks at the end of February were estimated at 5,260 long tons, which represents a probable minimum level.

February production of GR-S latex totaled 1,816 long tons, dry weight; consumption, 1,553 long tons; and month-end stocks, 1,579 long tons. March production was estimated at 2,295 long tons. In view of *Hevea* latex prices and shortages, the demand for GR-S latex is increasing, but supplies are hampered by the general styrene shortage and the strong demand for solid GR-S. Bulk prices for GR-S latex continue unchanged at 18.5-20.25¢ per pound.

Estimated neoprene latex domestic consumption during 1949 was 3,750 long tons, dry weight. For the first two months of this year, domestic consumption of neoprene latex is estimated at 289 long tons, and stocks at 316 long tons.

RECLAIMED RUBBER

AN IMPROVEMENT in demand for reclaimed rubber was noted in April as a result of the high levels reached by crude rubber prices. Production of reclaim was at a high level, and exports continued at moderate volume. The outlook for reclaim remains satisfactory in view of high crude rubber prices.

Final January and preliminary February statistics on the domestic reclaimed rubber industry are now available. January production totaled 19,447 long tons; consumption, 20,106 long tons; exports, 902 long tons; and month-end stocks, 27,319 long tons. Preliminary figures for February give a production of 20,415 long tons; consumption, 19,824 long tons; exports, 790 long tons; and month-end stocks, 27,173 long tons.

No changes were made in reclaimed rubber prices during April, and current prices follow:

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8.25/ 8.75
Peel	1.18-1.20	8.25/ 9.25
Inner tube		
Black	1.20-1.22	11.50/12.50
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

THE scrap rubber industry reported only moderate activity during April. Tires moved in limited tonnages without consistent demand, but reports indicate mills may enter the market in May for larger quantities of scrap rubber. Tubes were in steady demand, and dealers were said to have no difficulty in securing outlets

for their supplies both in the East and at Akron.

Export business was slack, continuing the slump evident during the first quarter of the year. Some export shipments were made in moderate volumes, but no large-scale purchases were noted. The problem of freight rates continues the major difficulty of the scrap rubber industry, and attempts being made at securing reductions in rates are being watched with great interest.

The only price change in scrap rubber during the month saw mixed auto tires drop from $13.50 to $11.50 per ton in the East, reflecting the lack of consumer interest in this area. Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at the points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$11.50	$13.50
Peelings, No. 1	52.25	52.25
3	30.25	30.25
	(¢ per Lb.)	
Black inner tubes	3.50	3.50
Red passenger tubes	7.50	7.50

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Feb. 5	Mar 25	Apr. 1	Apr. 8	Apr. 15	Apr. 22
July	32.31	32.20	32.25	32.57	32.71	32.78
Oct.	30.14	30.51	30.67	30.66	30.88	31.64
Dec.	29.96	30.35	30.51	30.48	30.68	31.45
Mar.	29.95	30.30	30.51	30.48	30.73	31.50
May	29.82	30.14	30.50	30.44	30.17	31.55
July	29.35	29.75	29.99	29.91	29.67	31.10

COTTON prices moved irregularly higher on the New York Cotton Exchange during April. On the first day of the month the market was depressed by news that the President had signed legislation permitting an increase of 1,200,000 acres in the 1950 cotton acreage program, making the total 22,200,000 acres. This decline was short-lived, since reports were received that the House had passed the foreign aid bill providing funds for ECA, thus assuring continuing strong foreign demand for American cotton.

Heavy export fixing based on reports that ECA cotton buying during the next few months will exceed previous estimates served to start the price advance that continued throughout the balance of the month of April.

Other factors influencing this advance were speculative buying, short covering, and reports of serious weevil infestation in the growing area. Support in new crop months was based on the expectation of a smaller crop because of reduced plantings to qualify for government loans.

The Exchange reported that cotton exports for the season, as of April 25, totaled 3,780,074 bales, as compared with 3,462,255 bales during the same period last season. Allotments for cotton buying announced by ECA last month follow: Norway, $2,200,000; Italy, $7,000,000; Western Germany, $40,000,000; United Kingdom, $2,000,000; and Austria, $2,000,000.

The 15/16-inch middling spot price started at the monthly low of 32.80¢ on April 1 and rose to a high of 33.53¢ on April 29. Futures prices showed similar movement: July futures rose from 32.25¢ on April 1 to a high of 32.94¢ on April 25 and closed at 32.93¢ on April 29, the last day of trading.

Fabrics

The industrial gray goods market reported a brisk business in sateens and wide drills last month. Wide drills were active through June, while sateens sold into the third quarter. Hose and belting ducks and chafer fabrics displayed renewed activity and sold into June at firm prices. Numbered ducks were said to be the only type of industrial fabrics still available in mill stocks, but inventories were indicated as being at normal levels.

Sales of headlining fabrics were somewhat hampered by the Chrysler strike, but contracts were put through for May delivery. Print cloths were relatively quiet as mills and purchasers awaited further price movements. Market activity in osnaburgs was relatively light, although good demand for the 40-inch 2.11-yard construction was noted for spot delivery. Sheetings reported good demand into June; while standard drills and twills sold into the fourth quarter.

Cotton Fabrics

Drills			
59-inch 1.85-yd.	yd.	$0.37	
2.25-yd.		.32	
Ducks			
38-inch 1.84-yd. S. F.	yd.	.425	
2.90-yd. D. F.		.305	/ .325
51.5-inch 1.35-yd. S. F.		.4575	/ .46
66-inch 1.02-yd. S. F.		.73	
Hose and belting		.59	
Osnaburgs			
40-inch 2.11-yd.	yd.	.25	
Raincoat Fabrics			
Bombazine, 64x60 5.35-yd	yd.	.215	
Print cloth, 38½-inch, 64x60		.1625	
Sheeting, 48-inch, 4.17-yd.		.21	
52-inch 3.85-yd		.2225	
Chafer Fabrics			
14-oz./sq. yd. Pl.	lb.	.64	
11-65-oz./sq. yd. S		.59	
10-80-oz./sq. yd. S.		.61	
8.9-oz./sq. yd. S.		.645	
Other Fabrics			
Headlining, 59-inch 1.35 yd-2-ply	yd.	.565	
64-inch 1.25-yd. 2-ply		.6063	
Sateens, 53-inch 1.32-yd.		.57	
58-inch 1.21-yd		.6238	
Tire Cords			
K. P. std., 12-3-3	lb.	.685	
12-4-2		.675	

RAYON

TOTAL rayon shipments to domestic consumers during March reached a new high of 103,700,000 pounds, an increase of 10% over the February total. Of this figure, 78,800,000 pounds were rayon filament yarn and comprises 26,500,000 pounds of viscose and cupra textile yarn, 25,900,000 pounds of viscose high-tenacity yarn, and 26,400,000 pounds of acetate filament yarn. Domestic shipments of high-tenacity yarn during the first quarter of 1950 amounted to 74,900,000 pounds, an increase of 10% over shipments in the corresponding period in 1949.

Production of tire cord and fabric, including chafers, in 1949 totaled 447,000,000 pounds, 18% under the 1948 total. Of this figure, 282,000,000 pounds were of rayon and nylon, 13% above 1948 production; while cotton tire yarn and fabric production totaled 165,000,000 pounds, 43% below the 1948 level. Excluding the figures for cotton chafer fabrics which are used in all types of tires, rayon was used in 71% of the total 1949 production of tire cord and fabric, as compared with 53% in 1948. Fourth-quarter 1949 production of rayon tire cord and fabric was 81% of the total cord and fabric production, and a further increase is expected this year.

No changes occurred in rayon tire yarn and fabric prices last month, and current prices follow:

Rayon Prices

Tire Yarns		
1100/ 480	$0.55	
1100/ 490	.55	
1150/ 490	.55	
1650/ 720	.54	
1650/ 980	.54	
1900/ 980	.54	
2200/ 960	.53	
2200/ 980	.53	
4400/2934	.55	/ $0.56
Tire Fabrics		
1100/490/2	.67	
1650/980/2	.645	/ .66
2200/980/2	.63	

Compounding Ingredients— Price Changes and Additions

Accelerators, Organic			
Santoflax 35	lb.	$0.65 /	0.72
BX	lb.	.58 /	65
Accelerator-Activators, Inorganic			
Litharge, Eagle	lb.	.14 /	.141
National Lead	lb.	.14 /	.141
Red lead, Eagle	lb.	.15	
National Lead	lb.	.15	
White lead silicate, Eagle	lb.	.15 /	.1675
National Lead	lb.	.1325 /	.1425
Carbon Blacks—HAF			
Philblack O	lb.	.07 /	.114
Statex R	lb.	.074 /	.12
Chemical Stabilizers			
Witco Lead Stearate #50	lb.	.5025	
Stabilizer #70	lb.	1.25	
Colors—White			
Cryptone BT	lb.	.0825/	.0925
Zinc oxide:			
Azo ZZZ-11, -44, -55	lb.	.115 /	.125
-66	lb.	.1375/	.1475
35% leaded	lb.	.1175/	.1275
Eagle AAA, lead free	lb.	.115 /	.125
5% leaded	lb.	.115 /	.125
35% leaded	lb.	.1175/	.1275
50% leaded	lb.	.11⅞/	.12⅞
Florence Green Seal	lb.	.14 /	.15
Red Seal	lb.	.135 /	145
White Seal	lb.	.145 /	.155
Horsehead XX-4, -78	lb.	.1225/	.1325
Kadox-15, -17, -72	lb.	.1225/	.1325
-25	lb.	.145 /	.155
Lehigh, 35% leaded	lb.	.12⅜/	.13⅜
50% leaded	lb.	.125 /	.135
Protox-166	lb.	.1225/	.1325
Standard, 5% leaded	lb.	.1225/	.1325
Colors—Brown			
Brown, Mapico	lb.	.1225/	.125
Tan, Mapico	lb.	.1925/	.195
Fillers, Inert			
Lithopone, Albalith	lb.	.0625/	.0725
Mold Lubricants			
Carbowax compounds	lb.	.29 /	.295
DC Mold Release Fluid	lb.	4.70 /	6.00
Emulsion Nos. 35, 35A, 35B	lb.	1.77 /	3.50
Polyethylene Glycols	lb.	.23	
Plasticizers and Softeners			
Harflex 500	lb.	.34 /	.365
Vulcanizing Agents			
Litharge, Eagle	lb.	.14 /	.141
National Lead	lb.	.14 /	.141
Red lead, Eagle	lb.	.15	
National Lead	lb.	.15	
White lead silicate, Eagle	lb.	.15 /	.1675
National Lead	lb.	.1325/	.1425

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Imports for Consumption of Crude and Manufactured Rubber	January, 1950 Quantity	January, 1950 Value
UNMANUFACTURED, Lbs.		
Crude rubber	121,580,009	$17,881,882
Rubber latex	8,902,169	1,951,793
Balata	136,948	42,855
Jelutong or Pontianak	83,328	18,308
Gutta percha	125,760	35,288
Synthetic rubber	3,715,378	615,043
Reclaimed rubber	56,070	1,705
Scrap rubber	1,900,867	57,707
TOTALS	136,500,529	$20,604,581
MANUFACTURED		
Tires: auto, bus, truck, *no.*	1,491	$19,554
Bicycle *no.*	2,176	1,073
Inner tubes: auto, etc., *no.*	11	13
Rubber footwear:		
Boots *prs.*	1,870	4,515
Shoes and overshoes. *prs.*	3,695	2,016
Rubber-soled canvas shoes *prs.*	1,050	368
Athletic balls: golf *no.*	1,200	351
Tennis *no.*	6,503	611
Other *no.*	306,292	31,068
Rubber toys, except balloons	.....	49,222
Hard rubber products	.....	12,067
Rubber and cotton packing *lbs.*	859	913
Gaskets and valve packing	.....	382
Molded rubber insulators	.....	3,987
Hose and tubing	.....	2,806
Nipples and pacifiers *gr.*	2,050	2,306
Rubber instruments *doz.*	3,402	1,272
Bands *lbs.*	1,538	921
Other rubber products	.....	181
Gutta percha products. *lbs.*	725	508
Synthetic rubber products	.....	1,177
Other soft rubber goods	.....	42,307
TOTALS	.....	$177,618
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$20,782,199

Exports of Domestic Merchandise	January, 1950 Quantity	January, 1950 Value
UNMANUFACTURED, Lbs.		
Chicle and chewing gum bases	189,370	$79,691
Balata	500	1,450
Synthetic rubbers: GR-S	209,479	56,586
Neoprene	758,904	260,988
Nitrile	252,623	122,014
"Thiokol"	2,000	1,120
Polyisobutylene	69,154	21,639
Other, except Butyl	7,537	2,851
Reclaimed rubber	2,021,450	155,533
Scrap rubber	1,611,598	37,633
TOTALS	5,122,625	$739,505
MANUFACTURED		
Rubber cement *gals.*	53,728	$98,897
Rubberized fabric: auto cloth *sq. yds.*	5,070	6,069
Piece goods and hospital sheeting *sq. yds.*	48,513	30,967
Rubber footwear:		
Boots *prs.*	8,594	28,747
Shoes *prs.*	1,723	2,351
Rubber-soled canvas shoes *prs.*	9,450	16,475
Soles *doz. prs.*	31,296	83,929
Heels *doz. prs.*	56,193	56,923
Soling and toplift sheets *lbs.*	271,319	40,367
Gloves and mittens *doz. prs.*	9,958	36,671
Drug sundries: water bottles and fountain syringes *no.*	21,792	12,277
Other	.....	151,877
Rubber and rubberized clothing	.....	57,631
Toy and novelty balloons	.....	23,616
Rubber toys and balls	.....	15,948
Erasers *lbs.*	17,271	13,024
Hard rubber goods:		
Battery boxes	22,241	36,027
Other electrical goods, *lbs.*	79,871	54,129
Combs, finished *doz.*	6,049	5,255
Other	.....	7,525
Tires and casings:		
Truck and bus *no.*	80,487	2,954,207
Auto *no.*	43,953	557,298
Aircraft	.....	71,697
Farm tractor, etc. *no.*	7,082	225,913
Other off-the-road *no.*	2,156	221,865
Bicycle *no.*	7,558	8,622
Motorcycle *no.*	102	836
Other *no.*	1,389	22,210
Inner tubes:		
Auto, bus, truck *no.*	49,252	167,809
Other *no.*	11,536	31,278
Solid tires:		
Truck and industrial. *no.*	2,254	87,842
Tire repair materials:		
Camelback *lbs.*	123,813	30,254
Other *lbs.*	186,943	125,880
Rubber and friction tape *lbs.*	42,668	28,056
Belting:		
Auto and home *lbs.*	68,802	81,578
Transmission:		
V-belts *lbs.*	75,839	137,175
Flat belts *lbs.*	45,155	48,051
Other *lbs.*	15,489	14,044
Conveyer and levitator *lbs.*	50,885	36,934
Other *lbs.*	30,926	29,585
Hose and tubing *lbs.*	424,519	299,533
Rubber packing *lbs.*	103,213	106,720
Mats, flooring, tiling, *lbs.*	611,706	140,131
Rubber thread: bare *lbs.*	13,112	19,277
Textile covered *lbs.*	12,658	32,628
Gutta percha manufactures *lbs.*	3,166	3,194
Latex and other compounded rubber for further manufacture *lbs.*	274,972	104,461
Other natural and synthetic rubber manufactures	.....	335,220
TOTALS	.....	$6,704,003
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$7,443,508

Reexports of Foreign Merchandise	January, 1950 Quantity	January, 1950 Value
UNMANUFACTURED, Lbs.		
Crude rubber	965,825	$225,196
Balata	4,925	2,121
TOTALS	970,750	$227,317
MANUFACTURED		
Drug sundries	.....	$120
Rubber toys and balls	.....	1,287
Tires and casings:		
Auto *no.*	16	196
Farm tractor and off-the-road *no.*	65	1,769
Inner tubes:		
Auto, truck, bus *no.*	65	343
Other *no.*	65	275
Solid tires: truck and industrial *no.*	100	8,427
Rubber hose and tubing *lbs.*	1,600	1,911
Other natural and synthetic rubber manufactures	.....	682
TOTALS	.....	$15,010
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$242,327

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

United States Rubber Statistics — January, 1950

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Month End-Stocks
	Production	Imports	Total	Consumption	Exports	
Natural rubber, total	0	54,277	54,277	56,135	431	103,064
Latex, total	0	3,974	3,974	3,857	0	5,705
Rubber and latex, total	0	58,251	58,251	59,992	431	108,769
Synthetic rubber, total	*22,447 †5,361	1,659	29,467	33,966	546	92,284
GR-S types	*18,124 †800	1,582	20,506	25,395	94	72,049
Neoprene	†3,603	0	3,603	3,099	339	4,813
Butyl types	*4,323	77	4,400	4,536	0	12,080
Nitrile types	†958	0	958	936	113	3,342
Natural rubber and latex, and synthetic rubber, total	27,808	59,910	87,718	93,958	977	201,053
Reclaimed rubber, total	19,447	0	19,447	20,106	902	27,319
GRAND TOTALS	47,255	59,910	107,165	114,064	1,879	228,372

*Government plant production.
†Private plant production.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, February, January, 1950; First Two Months, 1950-1949

	February, 1950	% of Change from Preceding Month	January, 1950	First Two Months, 1950	1949, First Two Months
Passenger Casings					
Shipments					
Original equipment	2,890,653		2,747,771	5,638,424	3,724,715
Replacement	2,332,801		2,190,651	4,523,452	4,388,043
Export	37,175		48,880	86,055	72,768
TOTAL	5,260,629	+ 5.48	4,987,302	10,247,931	8,185,526
Production	5,605,890	− 1.84	5,710,675	11,316,565	9,554,425
Inventory end of month	9,784,715	+ 3.12	9,488,993	9,784,715	10,180,130
Truck and Bus Casings					
Shipments					
Original equipment	355,941		345,982	701,923	751,049
Replacement	536,835		512,761	1,049,596	1,055,337
Export	62,872		66,950	129,822	159,059
TOTAL	955,648	+ 3.24	925,693	1,881,341	1,965,445
Production	1,084,713	− 2.87	1,116,701	2,201,414	2,232,343
Inventory end of month	2,011,912	+ 7.17	1,877,315	2,011,912	2,205,330
Total Automotive Casings					
Shipments					
Original equipment	3,246,594		3,093,753	6,340,347	4,475,764
Replacement	2,869,636		2,703,412	5,573,048	5,443,380
Export	100,047		115,830	215,877	231,827
TOTAL	6,216,277	+ 5.13	5,912,995	12,129,272	10,150,271
Production	6,690,603	− 2.00	6,827,376	13,517,979	11,786,768
Inventory end of month	11,796,627	+ 3.79	11,366,308	11,796,627	12,385,460
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	3,245,022		3,089,546	6,334,568	4,465,834
Replacement	2,306,820		2,164,212	4,471,032	4,693,270
Export	58,059		58,270	116,329	172,615
TOTAL	5,609,901	+ 5.61	5,312,028	10,921,929	9,331,719
Production	5,803,209	+ 3.09	5,629,229	11,432,438	9,984,123
Inventory end of month	11,058,688	+ 1.22	10,925,678	11,058,688	10,442,118

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

Effective July 1, 1947

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
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RUBBER CHEMIST FOR TECHNICAL SERVICE OR ASSISTANT chief chemist, tires, mechanical or general. Broad experience in tires, oil resistant products, sponges, plastics, supervision. 30, family. M. I. T. graduate. Address Box No. 557, care of INDIA RUBBER WORLD.

PLANT MANAGER, SUPERINTENDENT, CHEMIST, OR ASSISTant to same. Experienced in all departments. Expert compounder and chemist. Cost minded. Can handle help. Familiar with heavy and light mechanicals. Molded, extruded rubber goods. Will go anywhere. Address Box No. 558, care of INDIA RUBBER WORLD.

CHEMIST WITH PRACTICAL EXPERIENCE IN PRESSURE tape and laminating adhesives, lacquer-coated goods, quarter lining, rubber-, resin-, and lacquer-cements. Middle aged. Reliable, unselfish assistant to department head. Address Box No. 559, care of INDIA RUBBER WORLD.

TECHNICAL SALES—SERVICE—REPRESENTATION: ENERgetic, alert individual with a rubber chemistry background and twelve years of experience in all phases of tire manufacturing seeks technical sales and service representation for a manufacturer or merchandiser serving the rubber industry in U. S. or abroad. Age 39, married, M.S. in chemistry, two years toward Ph.D. in languages; excellent references. Address Box No. 567, care of INDIA RUBBER WORLD.

PATTERN DESIGNER OR PRODUCTION SUPERINTENDENT with 17 years' experience in canvas and rubber footwear desires new connections. Age 36. Location immaterial. Address Box No. 568, care of INDIA RUBBER WORLD.

CHEMIST-SUPERVISOR. EIGHT YEARS' EXPERIENCE IN hose and belt compounding and design; group and department supervision. Age 34. Desires development or technical sales. Address Box No 569, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED: CHEMIST—FULLY EXPERIENCED VINYLS AND pyroxylin-coated fabrics. Manufacturer Connecticut location. Address Box No. 560, care of INDIA RUBBER WORLD.

RUBBER CHEMIST: THREE TO FIVE YEARS' LABORATORY or factory experience sole and heel industry or mechanical goods. Send complete résumé with salary desired. Address Box No. 561, care of INDIA RUBBER WORLD.

WANTED: EXPERIENCED COST ESTIMATOR FOR EXTRUDED and molded goods by Michigan manufacturer employing three hundred. Time study and methods experience desirable, but not necessary. Address Box No. 562, care of INDIA RUBBER WORLD.

EXPERIENCED WIRE AND CABLE MAN FOR SCHEDULING and planning production, insulated copper wire. Apply to CRESCENT COMPANY, Pawtucket, Rhode Island.

LATEX CHEMIST, EXPERIENCED IN COMPOUNDING FOR expansion existing laboratory. Address Box No. 563, care of INDIA RUBBER WORLD.

ADHESIVES CHEMIST: EXPERIENCED IN DEVELOPMENT OF synthetic and natural rubber latex cements, and resin emulsion adhesives; by firm in large Midwest city. Position permanent. Send complete resumé, recent photograph, and salary desired. Address Box No. 571, care of INDIA RUBBER WORLD.

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WANTED: WELL-KNOWN BRITISH COMPANY IS INTERested in original rubber products (patented for preference), automotive in particular. Address Box No. 564, care of INDIA RUBBER WORLD.

AN OPPORTUNITY FOR SMALL AND MEDIUM MANUFACTURERS TO HAVE REAL SALES REPRESENTATION covering New York and vicinity—rubber and kindred lines wanted; complete coverage; commission basis; exclusive arrangement only. Address Box No. 565, care of India RUBBER WORLD.

WANTED

Financially responsible organization will purchase complete sponge and mechanical rubber goods plant with presses, calenders, mills and extruders. Will consider all offers. Please give complete details first letter.

Address Box 555,
c/o INDIA RUBBER WORLD

WANTED — Large engineering firm wishes to acquire several complete Rubber Plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. Box 1220, 1474 Broadway, New York 18, N. Y.

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FOR SALE: BANBURY MIXERS, MILLS, CALENDERS, LABORatory Mill and Banbury Unit, Extruders, Tubers, Hydraulic Presses. Send for detailed bulletin. EAGLE INDUSTRIES, INC., 110 Washington Street, New York 6, N. Y. DIgby 4-8364-5-6.

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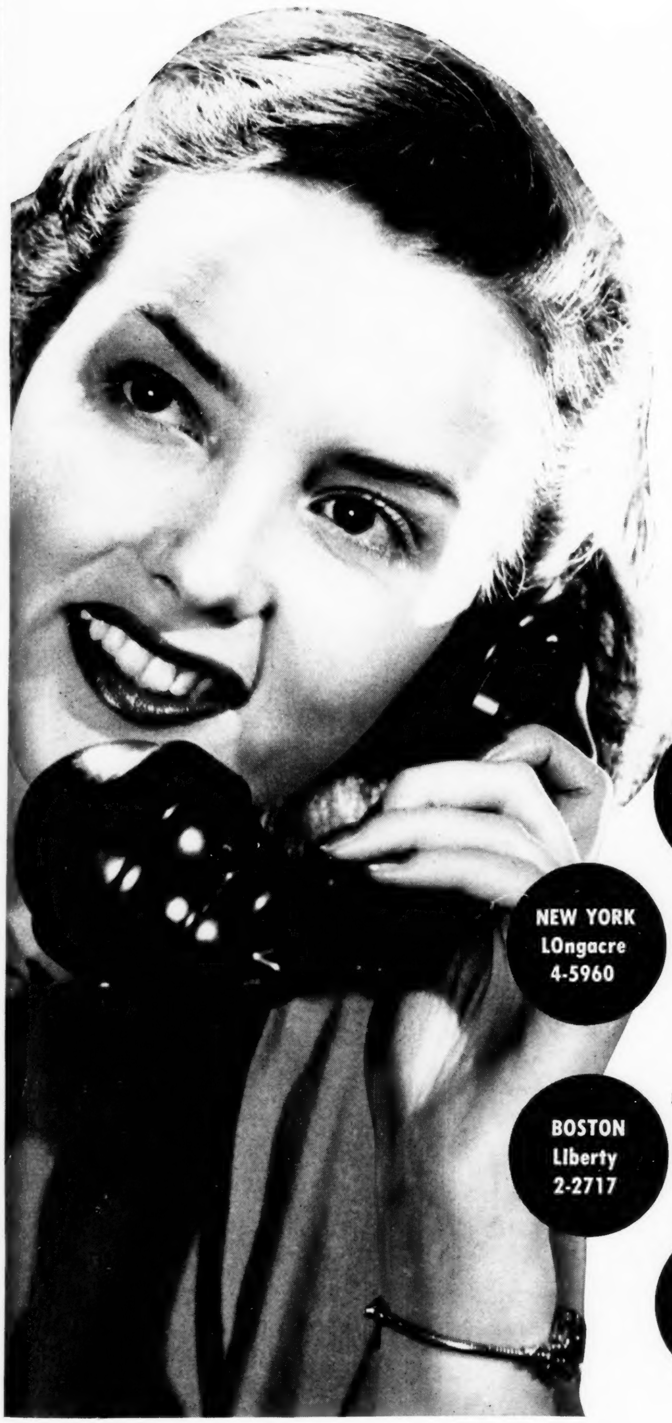

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